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ABSTRACT

This report presents the findings of research conducted at 10 public sites during the Alternate Media Center/WETA-TV teletext trial in Washington, D.C., from June 1981 to July 1982, in which two different services were tested using Telidon technology. The first, which is characterized as a small electronic newspaper, placed more emphasis on timely "hard" information; the second, characterized as a small electronic feature magazine, placed greater emphasis on design and a stylized presentation of "soft" content. A discussion of teletext users and behaviors at the public sites includes teletext user characteristics, length of viewing sessions, user difficulties, quantitative data, reception problems and user trouble, and qualitative observations. Information on content selections includes gross statistics, selection of indexes and content frames, popularity of topic groups, selection rating of topic groups, most popular frames, changes in use over time, and updating and frequency of use. A section on user evaluations of the teletex service examines general reactions to the service, attractiveness of public site terminals, willingness to pay, and information wants. Final sections address social integration, terminals in public locations, costs/pricing in public locations, system issues, system features and teletext standards, and teletext and public broadcasting. Appendices contain information on service content and supplementary tables related to teletext users, content selections, and user evaluations. (LMM)

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Research on Broadcast Teletext:

Working Paper Number Eight

TELETEXT USAGE IN PUBLIC PLACES

John Carey and Mark Siegeltuch

November 1982

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Our study of teletext usage at public locations was a somewhat self-contained activity within the larger trial. For this reason, we wish to acknowledge both those who assisted us directly in conducting the study, as well as many individuals connected with the trial who guided and supported our work. In particular, we owe a debt to Red Burns, Project Director, and Martin Elton, Principal Investigator, who conducted the teletext trial with extraordinary skill and professional values.

We also wish to thank Philip Rubin, Chief Scientist at the Corporation for Public Broadcasting, and William Lucas, formerly Deputy Administrator at the National Telecommunications and Infomation Administration who helped to launch the trial through an earlier planning study and later guided it through many travails. In addition, Charles Brownstein, Program Officer at the National Science Foundation, provided thoughtful critiques and helpful suggestions to the research team throughout the trial.

In conducting the study, we received valuable advice from Ric Irving, who also designed the database management system which we employed in our research. Similarly, we received thoughtful counsel from Martin Nisenholtz, who directed the design research for the project. Our fieldwork and statistical tabulations were assisted by Thomas Carey and Esperanza Caño.

The study would not have been possible without the professional team of artists, editors, field engineers and writers who created and managed the service. They included Patricia Quarles, Manager of the Teletext Service, along with Janet Byrne-Smith, Rick Cornell, Elizabeth Garcy, Christopher Haslam, Cynthia Powers, and Amy Zimmerman. Don Quayle directed WETA's efforts in the trial and provided direct help to us through his liaison work with the public teletext sites. In addition, Gary Schober served as engineering consultant to the project.

This study was conducted at ten public locations: American Automobile Association; Bureau of National Affairs; Capital Children's Museum; Gallaudet College; Lewinsville Senior Citizens Center; Martin Luther King Library; National Press Club; Rockville Jewish Community Center; The Smithsonian Institution; and Walt Whitman High School. Representatives from these organizations who participated in the project were: Thomas Clagholz; Cymma Hefter; Peter Hirschberg; Margaret Hurney; John Jenkins; Jim Knauss; Matt Lyle; Lawrence Malumby; Jerry Marco; Jewel Oganji; and Mary Grace Potter.

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SUMMARY

This report presents the findings of one component in a teletext field trial conducted by the Alternate Media Center, working in collaboration with WETA TV. The trial was located in Washington, D.C., and employed Telidon technology. It ran from June 1981 through July 1982. Decoders and TV sets were placed in 40 homes and 10 public locations. The results of the public site research are described here. They are based upon a meter record of more than 12,000 user sessions; on-site observation and notation of 239 user sessions; a survey of 235 teletext users; and qualitative findings during 175 hours of on-site ethnographic recording.

In general, the findings of the public site research are very positive. They suggest that people liked teletext and found it a useful service in public locations. In addition, a majority of survey respondents indicated a willingness to purchase a teletext equipped TV in order to receive the service at home. At the same time, the study uncovered a number of problems associated with the keypad design, software architecture, and slow access to frames of information.

Teletext users were predominantly male. Further, those under 30 years of age used teletext more frequently than older citizens. The service was used equally by Blacks and Whites.

Viewing sessions were relatively short. An average session lasted 4 minutes, 21 seconds. However, 60% of viewing sessions were 3 minutes or less.

During the trial, an average of 26 people used teletext per day, at each site. This represents a broad range in usage, from under 10 individuals per day at some locations to over 50 per day at others. A typical viewing session consisted of 8 frame accesses.

Two teletext services were tested during the trial. The first service, from June - December 1981, may be characterized as a small electronic newspaper. The most popular information categories were News, Entertainment, Sports and Weather. Popular frames included the lead news story, a sports quiz, horoscopes, local and 3-Day weather forecasts, and movie listings. The second service, from January - July 1982, may be characterized as a small electronic feature magazine. The most popular information categories were Games, Weather, Community & Cultural Events, and Business Analysis. Popular frames included electronic art, a ski report, local weather, logic puzzle, job listings, and chess problems.

The first service, emphasizing timely "hard" information appears to have had strong general appeal. The second service, emphasizing a stylized presentation of "softer" content, appears to have had somewhat less appeal to middle age males. However, it had strong

appeal to teenagers, women, and Blacks.

Survey respondents indicated that they liked the service, particularly the graphics. However, they found the waiting time for frames (averaging 6-7 seconds when the questionnaire was distributed) unacceptably long. Eighty percent indicated that they would use a public teletext service if it were available on a permanent basis, and 53% indicated that they would choose a teletext equipped TV (at a premium of $ 200 over the normal cost of a TV) when they entered the market for a new TV. Willingness to pay was higher among heavy TV viewers; those who have already purchased a new piece of technology (e.g. a video game); light/moderate readers of newspapers and magazines; Blacks; blue collar workers; and households with an income of 10-20K per year.

When asked what types of information services they wanted most from a teletext service, respondents frequently indicated: News; Entertainment and Lists of Events; Weather; Games; Sports; and Business Information.

Direct observations at the sites revealed that many people had difficulty in understanding how to use the teletext service. Age was an important element which appeared to influence user facility with teletext. Those between 10-30 demonstrated a facility with keypads which was largely absent from those over 50 years of age. In addition, the public site observations suggested a need for secure TVs which users cannot touch; large keypads and keys; and a simple, linear organization of frames.

It is argued in this report that the public site findings provide support for continued teletext activities by public broadcasting, including terminals in public locations. While many citizens will require assistance in learning how to use keypads and electronic text on a TV screen, there appears to be a strong potential audience for teletext services.

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1. INTRODUCTION

This report presents the findings of research conducted at public sites during the Alternate Media Center/WETA teletext trial in Washington, D.C. The teletext trial ran from June 1981 through July 1982.[1] The teletext trial employed Telidon technology and equipment supplied by Norpak Ltd. and Electrohome Ltd, with host computer support from Digital Equipment Corporation.

Decoders were located in 40 homes, 10 public locations, and a few demonstration sites (which were not related to the research). This report treats the public site research only. The public teletext sites consisted of 2 office buildings, 2 community centers, 2 libraries, 2 museums, and 2 schools (1 college and 1 high school). The specific location of the teletext TV within each building varied from site to site. However, in most instances it was located in a lobby or exhibit area.

During the trial, two distinct services were tested. From June 1981 through December 1981 a service with approximately 120 frames was offered. It contained news, sports scores, business information, weather, entertainment, library events and consumer information. The service had a cycle time of approximately 20-25 seconds, using 4 lines of the vertical blanking interval.

In January 1982, a second service was begun. It continued through July 1982. The new service contained 60-70 frames in a

1. When the trial ended, WETA assumed responsibility for the equipment and staff, and has continued to provide a teletext service.

12-14 second cycle, using 4 lines of the vertical blanking interval. Content in the new service included games, electronic art, community events, financial analysis, weather and consumer information. For the reader who has not seen the two services, a crude analogy may help to describe them. The first service represented a small electronic newspaper. The second service represented a small electronic feature magazine. The first service placed more emphasis upon timely "hard" information. The second service placed greater emphasis upon design and a stylized presentation of "soft" content.

Our study of the public teletext sites has four components:

- Recorded data from a meter which was attached to each decoder at the public sites. The meter recorded each frame accessed and the time of day for each access. Throughout the trial, we recorded over 12,000 user sessions and more than 100,000 individual frame accesses.
- A questionnaire which was filled out by 235 respondents. Each of these individuals had used the teletext service. 60% were occasional or frequent users, while 40% had used teletext for the first time, prior to answering the questionnaire.
- Systematic observation of 239 user sessions. We recorded the age group, sex, and race of users as well as the length of sessions, time of day, and incidents of difficulty in using the teletext service. We also developed a demographic map of those who passed near the teletext TV in order to compare the characteristics of people who actually used teletext with those of people who had the opportunity to use it.
- Qualitative observations and discussions with users. Our research team spent more than 175 hours at the public locations, observing general patterns of use (e.g. how people make use of written instructions near the keypad) and noting spontaneous user comments about the equipment and service.

Our presentation of the findings is straightforward. Section 2 discusses the demographic characteristics of people who used the teletext service, along with a series of behavioral issues associated with usage. Section 3 treats what people look at, for how long, and variations in usage among the sites. Section 4 analyzes user reactions to teletext and the likelihood of their buying it. Section 5 concludes with our interpretation of these findings. A series of Appendices contains many tables which supplement the data in the body of the report.

2. TELETEXT USERS AND BEHAVIOR AT THE PUBLIC SITES

Approximately 175 hours of systematic observation were undertaken at public teletext sites[2]. We gathered both quantitative data, e.g. the relative percentages of users who were male or female, and qualitative observations, e.g. user comments about the graphics. Both are presented in this section. In addition, we developed a demographic profile of those who passed near the teletext TV in order to compare the characteristics of teletext users with characteristics of those who had the opportunity to use it.

2.1 Teletext User Characteristics

Table 1 presents the age group, race and sex of teletext users at public sites. It may be noted the number of males and females who passed near the teletext TV was about equal. Thus, the 4 to 1 ratio of male to female users represents a strong finding of greater usage by males.

The racial composition of teletext users is virtually identical to the racial profile of those who passed near a teletext TV and had the opportunity to use it. Therefore, it appears that race was not an element which influenced usage.

In general, younger people (under 30) used teletext more than older individuals. Table 2 plots usage by age. It compares the ages of those who used teletext with the ages of those who passed near it.

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2. These observations were concentrated at three locations: Bureau of National Affairs; MLK Library; and The Smithsonian Institute. A smaller amount of observation time was allocated to the American Automobile Association; National Press Club; and Rockville Jewish Community Center.

TABLE 1.

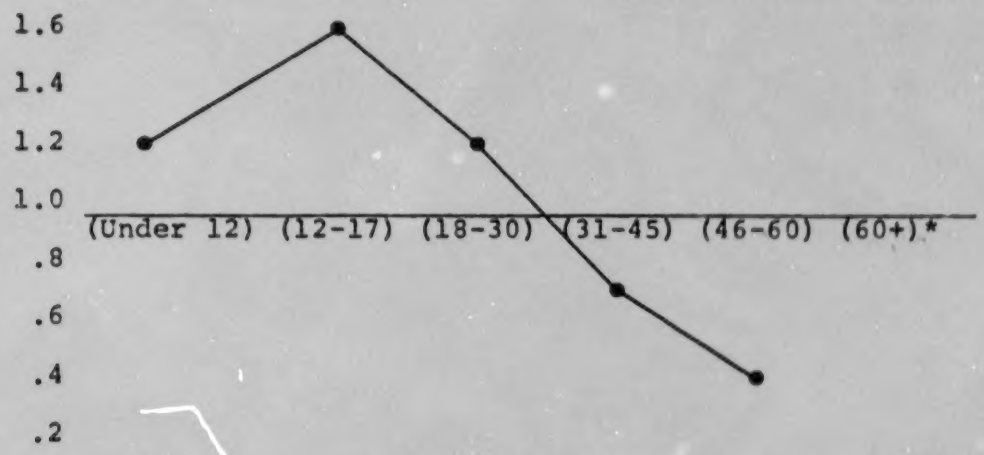
Teletext Users At The Public Sites

GROUP (N) (239)	% OF USERS
Sex	
Males (191)	79.9
Females (48)	20.1
Age	
Under 12 (17)	7.1
12-17 (52)	21.8
18-30 (91)	38.1
31-45 (65)	27.2
46-60 (11)	4.6
60+ (3)	1.2
Race	
White (155)	64.9
Black (68)	28.5
Other (16)	6.7

TABLE 2.

Age Profile Of Teletext Users

In order to develop the graph below, an age profile of persons at the three primary observation sites was developed. The percentage of teletext users in a given age category is divided by the percentage of persons in that age group who passed near a teletext TV. An age group which receives its "fair share" of usage would receive a rating of 1.0 If a group received more than its fair share, the rating would be above 1.0 Conversely, a rating below 1.0 indicates that the group received a smaller proportion of usage than one might expect by simple chance.



* The number of teletext users over the age of 60 was too small to be included in this graph.

Based upon 228 teletext users at 3 public sites.

2.2 Length of Viewing Sessions

Table 3 outlines the length of viewing sessions at the public sites. The average viewing session lasted 4 minutes, 21 seconds. It may be noted that the length of male and female viewing sessions was quite similar. Very young (under 12) and older users (46-60) had somewhat longer viewing sessions, while the patterns for those 12-45 were close to the norm presented in Table 3.

Viewing sessions at Martin Luther King Library and The Smithsonian were moderately longer than at the Bureau of National Affairs. It is reasonable to expect longer viewing sessions at a library and museum, in comparison with an office building.

TABLE 3.

Length of Viewing Sessions

LENGTH OF SESSION	% OF ALL USERS
1 Minute or Less	27.6
1:01 - 3:00	32.6
3:01 - 5:00	16.3
5:01 - 10:00	15.0
10:01 or Longer	8.2

Average Viewing Session: 4:21

Based upon observation and clocking of 239 user sessions.

Time of day also influenced the lengths of viewing sessions. From 9am to 4pm the patterns are quite similar, and approximate the distribution in Table 3. The viewing sessions were shorter than average from 4-6pm, then became sharply longer than average after 6pm. It appears that the 4-6pm period caught many people in a hurry as they proceeded from the building towards home. After 6pm, we encountered a second shift of guards and night workers who had more time to spend with teletext. These data are presented in Appendix B.

2.3 User Difficulties: Quantitative Data

During our observations of user sessions, we made a notation whenever a person exhibited difficulty in using the teletext system. No attempt was made to distinguish degrees of difficulty. Thus, minimal problems such as pressing the wrong key on the keypad, and complete frustration such as walking away from the teletext area without successfully accessing any frames are grouped together and presented in Table 4.

In general, the level of difficulty users experienced with teletext was moderate to high, with one third of all users experiencing some problem in accessing frames. Further, it appears that females experienced somewhat more difficulty in using the teletext system than males. User difficulties in relation to age reveal an interesting curve. Those under the age of 12 experienced a high level of difficulty in using the system. These difficulties decline with the next two age groups (12-17 and 18-30), then begin to increase again. Some of the

TABLE 4.

User Difficulties

GROUP (N)*	N EXPERIENCING SOME DIFFICULTY	% OF GROUP EXPERIENCING SOME DIFFICULTY
All Users (217)	74	34
Sex		
Males (176)	56	32
Females (46)	18	39
Age		
Under 12 (16)	6	38
12-17 (46)	15	33
18-30 (84)	23	27
31-45 (64)	23	36
46-60 (9)	6	67
60+ (**)		

* In order to distinguish trouble which may be associated with a reception problem, this table treats only those user sessions in which there were no reception problems.

** The sample of users over the age of 60 is too small to be treated here.

elements which contribute to user difficulties are discussed in Sections 2.5.4 - 2.5.6

2.4 Reception Problems and User Trouble

There has been much discussion about reception problems during the trial.[3] We observed a moderate level of reception problems during our preliminary observation period (January - February 1982). However, during our systematic observation period (March - June 1982) the reception was acceptable to good. During the 239 observed user sessions, there was a reception problem on 22 occasions (9.2% of sessions). When a reception problem did occur, an average of 1 frame in 5 did not display on a single pass. Since an average session consisted of 8 frames viewed, we estimate that only 1.8% of frame accesses during the observation period were subject to a reception problem (see Table 21).

It is important to note, first, that we did not conduct a technical assessment of reception problems. Second, our findings must be weighed along with the higher level of reception problems experienced in the homes and which we observed at public sites earlier in the trial. By the time we began to make a systematic record of reception problems, a number of technical adjustments had been made in the broadcast transmission and in decoders. These adjustments appear to have improved reception.

3. See Elton et al, Working Papers Numbers 1 and 6 for the teletext trial, and Gary Schober, "The Teletext Field Trial in Washington, D.C.: Technical Background and Issues," New York: Alternate Media Center 1981.

Our findings support those of the household research in suggesting that teletext reception is an important issue which must be addressed by the major broadcast networks. However, the public site findings also suggest that acceptable reception is not unachievable.

Finally, it is important to note that during those sessions when a reception problem occurred, users were perplexed by it. Often, they assumed that they had done something wrong, rather than recognize the trouble as a reception problem.

2.5 Qualitative Observations

Much of what one can learn during field research does not lend itself to statistical analysis. These qualitative observations and findings can provide useful knowledge to supplement quantitative measures and, at times, provide a form of learning which is missed in simple head counting.

We spent many hours at the public sites, watching people's behavior, listening to their spontaneous comments, and discussing the system with them. Three major findings emerged from this work, along with a series of detailed observations about user behavior:

- There are strong differences in the way people approach, react to, and use teletext related to their age. Young males and females (approximately 10-30) have a facility with keypads which is largely absent from the behavior of older individuals (45 and older). We encountered 10 year old children who could approach the teletext keypad and learn how to use the system in one or two minutes, though they possessed minimal reading skills. Indeed, in one instance at the Smithsonian, a young girl with minimal reading skills "teamed up" with an elderly man who was interested in teletext but would

not touch the keypad. She manipulated the keypad and accessed frames, which he then read aloud for both of them.

- The specific location of a teletext TV has a strong influence upon the behavior of those who use it. It appears that the social uses to which a space is normally put, "spill over" and affect people's social perception of a teletext TV and keypad. For example, teletext TVs and keypads were placed in two libraries. One was a research library and the other a community library. At the research library, the teletext TV was placed within the main reading room. Many people reacted negatively to teletext, commenting that its small capacity was useless in a research context. At the other library, the teletext TV was placed in a lobby area, near an information booth, bulletin boards, and posters. Here, the reaction to teletext was very positive. People commented that it was a useful supplement to the library and fun to use just before entering the reading room or upon leaving the library.

- When people first encounter a new piece of technology such as teletext, they often borrow habits and expectations from their experiences with other media and social events. They apply old and familiar habits to the new medium. For example, many people perceived teletext as a type of video game. They asked where the "cartridge" was and if they could buy an adaptor for their Atari in order to get teletext. This pattern of "borrowing" behavior from other experiences was manifested in small ways as well as general perceptions. One middle aged man rolled his thumb in a circular pattern and repeated "Come on 81" two or three times as he waited for frame 81 to appear. As it began to display on the screen, he snapped his fingers and commented "got it." The pattern closely mimicked the behavior of many individuals in gambling casinos - where he may well have acquired it.

2.5.1 Regular users and loyalty. By the time we began our study of the public sites (January 1982), the teletext trial was 8 months old. Regular users had emerged with specific teletext usage patterns and loyalty to particular frames. For example, a guard at the Smithsonian explained that he checked the weather

every morning along with the puzzles and word games. Two hours later, after his coffee break, he returned to the teletext TV and checked the solutions to the puzzles and word games. This pattern of viewing teletext more than once a day was common among a number of regular users.

In addition, many individuals developed a loyalty to certain frames and expressed a desire for more of the same or, in some cases, complained to us that their favorite frames had been removed from the service. The familiarity of these regular teletext users with specific frames and their accompanying strong opinions about them, resemble in some ways the strong reactions of many newspaper readers to specific columnists and services.[4]

2.5.2 Approaching the keypad. When a person passes near a teletext TV, two elements appear to affect his/her likelihood of stopping and approaching the keypad: the presence or absence of another person at the keypad; and the information on the screen. Curiously, the presence of another person at the keypad appears to attract more users. This phenomenon is a folkloric rule in the carnival business, and is put to use in gambling casinos. That is, in many casinos a shill is directed to sit at a Blackjack table in order to attract customers who might otherwise be afraid/cautious about approaching an empty table. A similar behavioral principle may have been functioning in the teletext

4. See Gerald Stone and Roger Wetherington, "Confirming the Newspaper Reading Habit." Journalism Quarterly 56 (3), 1978 pp 554-561.

trial, i.e. one user at the keypad reduced the potential discomfort which a newcomer might experience in approaching the area.

A person who passed a teletext TV in one of the public locations might see any of three possible alternatives on the screen: regular TV programming; a teletext content frame; or a teletext index frame. A teletext index frame was clearly the most enticing lure for a passerby. A teletext content frame was somewhat less enticing, while a screen with TV programming was decidedly unenticing. Our interpretation of this observation is that the index frame signalled to the passerby 1/ "You are looking at something new," and 2/ "You have to do something (press the keypad) to learn more about it." A teletext content frame signalled to a passerby that this was a new information service, but not necessarily that he or she must do something other than watch. This may have some implications for future public site teletext services. In general, we would recommend 1/ disarm the regular TV channels so that teletext alone can be accessed; and, 2/ build software into the decoder which automatically accesses the main index frame and displays it when no content frames have been selected for a given period of time (e.g. one minute).

In addition, we observed a curious three stage approach to teletext keypads by many middle age and older persons. Younger people tended to walk directly to the keypad or pass by it. However, many older persons would stop approximately six feet from the keypad, glance at the TV or instructions, then move to a closer

distance - three feet from the keypad. Finally, they moved to the keypad and touched it. This pattern occurred with sufficient frequency as to be noted in this report. Our hypothesis to explain this behavior is that people may have felt uncertain about the situation (e.g. it could have been a sales gimmick) and/or felt uncomfortable about touching "equipment." Others appear to have assumed that teletext is merely a display and that they did not have to touch anything in order to see the information. The latter situation points to a general problem with interactive technologies and the public. That is, with the exception of public telephones, people are not in the habit of manipulating technology in public settings. They are in the habit of passively watching displays. In this sense, public teletext and videotex as well as electronic banking centers are breaking new ground in public behavior.[5]

2.5.3 Spontaneous comments by users. We heard three types of recurrent comments by users. These addressed the nature of the teletext system, graphics, and the speed with which frames appeared after a keypad was pressed.

- Most users commented that the teletext service was a new type of information service or, some form of video game.

  "You can look up stuff."
  "It's a kind of programmed information."
  "You can play with it."
  "Where's the cartridge?"

5. See also, Fre Anne Lathem, "An Observational Study of Public Telephone Booths," New York: The Interactive Telecommunication Program, New York University 1982.

- Comments about the graphics were frequent and decidedly positive. In particular, users responded favorably to frames with simple animation, i.e. a new graphic appears automatically, after an initial graphic or screen of text has been displayed.

  "Isn't that pretty."
  "Really neat."

- Comments about the speed with which frames appeared were also frequent. However, they were decidedly negative. This is noteworthy since our observations took place in 1982, when the average access time had been reduced to 6-7 seconds.

  "It's slow as molasses."
  "It's not very quick."

2.5.4 Learning to use teletext. In observing many individuals who approached the keypad and attempted to "figure out" the system, a number of sobering and often ignored elements about the general public emerged. A large number of people have poor reading skills, poor eyesight, glasses with an incorrect prescription, and/or glasses which have not been cleaned in several years. These characteristics of many individuals in the general population are not helpful to those with an interest in promoting widespread use of teletext.

It is also apparent that the general public has very little experience with computer based technology of any kind. A concept such as "ENTER" which is second nature to a person involved in computer design (i.e. after hitting letter or number keys, one may be required to press an ENTER key) is by no means obvious to an ordinary citizen. People do not press ENTER after dialing a telephone or selecting a channel on a TV set. It is a new concept for most citizens and it must be learned.

In general, we observed many problems among individuals who attempted to learn and use the teletext system. While some of these problems (e.g. poor reading skills) do not lend themselves to a solution by system designers, others can be reduced by improvements in the software and design of keypads. For example, it appeared at first that the instructions near the teletext keypad were a source of confusion. However, a more fundamental problem soon became apparent. Most people, including those who were using teletext for the first time, did not bother to read the instructions. They wanted and expected the system to be transparent, much as a person who buys a ten dollar calculator wants it to be user transparent and tries it without reading the instructions. Similarly, many of those who read the teletext instructions did so only after trying the keypad and running into trouble.

This suggests that the design goal of a public teletext system should be extraordinary ease of use, requiring no instructions. This may be impracticable, but it appears to be the desire of most users. Where instructions are required or helpful, another person is clearly more helpful than written instructions in conveying the information. In a few instances, we stepped forward to help someone who experienced difficulty in using the system. In other instances, a previous user demonstrated the system for a subsequent user. In still other instances, local helpers emerged spontaneously, e.g. a guard at the Smithsonian and a maintenance worker at Martin Luther King Library. Each of these

peer instructors succeeded in "training" a new user with virtually no failures. When peer instruction was not available and a new user experienced difficulty, the written instructions were moderately helpful.

A few sets of written instructions were tried during the trial. None could be described as ideal. In general, a shorter set of instructions appeared to be more helpful. It was less intimidating and enabled a user to "get started." This may suggest a value in providing two levels of written instructions: 1/ very brief instructions to help a newcomer get started; and 2/ more detailed instructions for experienced users who want them.

2.5.5 Keypad pressing. The keypad which was used in the trial (see Figure 1) represented an early prototype for a home teletext service. It was not designed for public locations and indeed, has since been redesigned for more recent trials. Therefore, it is not surprising that the keypad provided a source of problems for some users. For example, the keys were too small for people with large hands or infirmities such as arthritis. We observed individuals who could not touch one key on the keypad without hitting an adjoining key inadvertently. This suggests that the keys on a keypad or terminal at public sites should be larger than those used in the Washington trial. Further, more space between keys will aid many potential users.

A second problem associated with the keypad was extra keys with no function. Many first time users "explored" the system. During this activity, they tested a number of "extra" keys.

When nothing happened, some of these users appeared to be perplexed.

The TV/TEXT key provided another source of confusion at the public sites. In order to switch from TV programming to a teletext mode, and vice versa, a user presses a single TV/TEXT key. When the TV is switched into a TV program mode, all of the keys, except the TV/TEXT key, are deactivated. Many individuals did not understand this. In their exploration of the system, they would switch into a TV program mode, then attempt to access a teletext frame - unsuccessfully.

In addition, some of the commands were more appropriate for a large database system than a teletext service. For example, there were two commands for CANCEL: 1/ a command to cancel keypad presses which had not yet been entered; and, 2/ a command to cancel a frame request which had been entered. A single CANCEL command would have been sufficient.

Perhaps the most perplexing problem for users was the "backup" of frame requests. If a person requested Frame 61 and it did not appear quickly, he/she might then request frame 80. In this instance, the decoder would grab frame 61, then grab and display frame 80 two seconds later - before the user had a chance to read frame 61. The problem can become comical when an impatient first-time user enters three or four frame requests in rapid order. This suggests a need for system software which automatically cancels all previous frame requests when any new frame request is entered. Alternatively, a buffer might store all of these requests. However, the concept of a buffer with

stored frames may be more appropriate for household teletext and, perhaps, public site teletext several years hence - when the broad public has moved up the learning curve in relation to computer-based systems.

In Figure 1 we display a drawing of the keypad used in the Washington trial. Figure 2 displays a drawing of an alternative design for a public site keypad. This was developed by the authors for discussion purposes. In our hypothetical keypad, all frame requests are based upon a simple number. There are no previous or next frames and no routing up or down a tree branching structure. Further, one key cancels any previous key presses. The ENTER key is large and attempts to mimic a supermarket cash register ENTER key with which the public is familiar. The analytic issue which underlies the keypad in Figure 2 concerns the reduction in <u>levels</u> of information structure. Most public information sources, e.g. sections in a newspaper, numbers in a telephone directory, and channels on a TV dial are organized in a simple linear fashion. At most, there are two levels in the organization of information (e.g. the Yellow Pages list "Automobiles" then "Automobiles - Repair Services" then the names and telephone numbers of repair shops). A public teletext service directed towards a general audience may require a similar linear structure.

FIGURE 1.

Teletext Keypad Used in the Trial

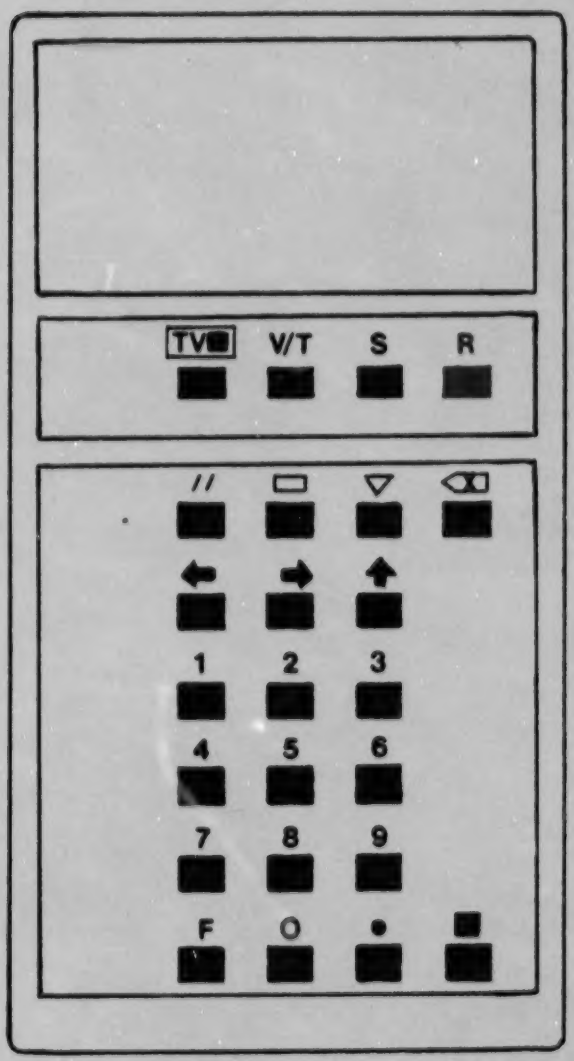
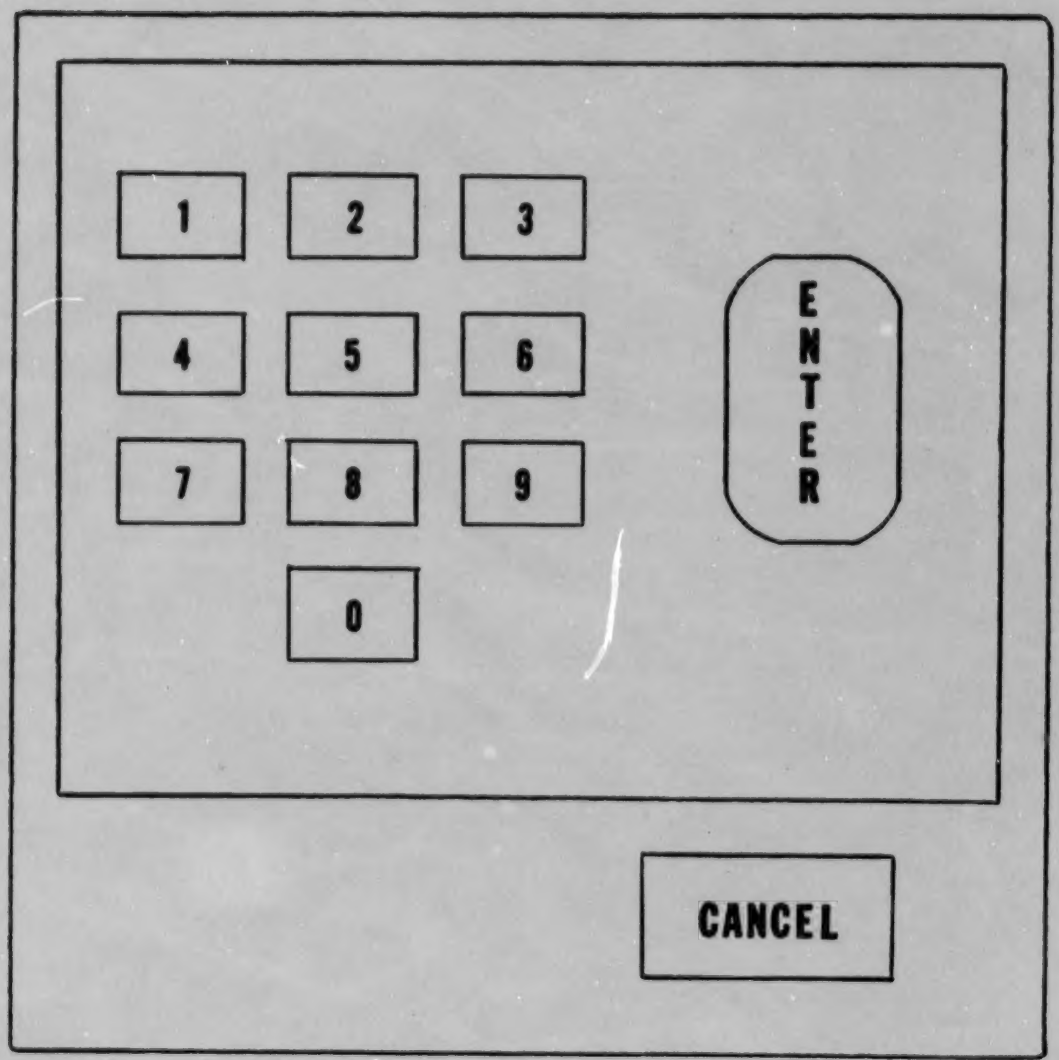


FIGURE 2.

An Alternative Keypad for Public Site Teletext



2.5.6 Users and trouble. Two issues emerged from our study of the strategies people employ when trouble occurs.

At a macroscopic level, some people attribute trouble to machines. If something goes wrong they blame the teletext system. This is good in that such individuals are likely to try to access a frame once or twice more before giving up. If it still doesn't work, they may come back tommorrow hoping that the system has been "fixed." However, other individuals appear to attribute "trouble" to their errors in using the system. From an observational perspective this becomes clear from what they say (e.g. "I'm no good with computers") as well as their demeanor when something goes wrong. Those who attribute the trouble to their inabilities are less likely to try again.

It appears that the age of a user has some influence on his/her attribution about the source of trouble. Youngsters tended to attribute the problem to the system. Moreover, they developed many strategies to "correct it" and persisted with relatively few signs of frustration. Middle-aged users tended to blame the system for trouble, but they had less patience if the problem persisted. Many older users however, attributed the trouble to their "lack of skill with computers" and were less likely to try again after initial lack of success.

At a microscopic level, there were four identifiable strategies which people employed after pressing some keys and not getting what they wanted. A specific user might employ 1,2,3 or all four of these strategies.

- Repeat the sequence they have just tried.

- Repeat a sequence they tried earlier and which was successful in accessing a frame.
- Randomly press keys.
- Check the written instructions.

A simple pattern runs through most of these strategies: users seek to achieve success, and find a cause/effect relationship between what they do and the result which follows. Even when randomly pushing keys, some users appear to want something to happen and to find a connection between their key pressing and the frame which appears.

These two sets of observations suggest a potential way to help users who are experiencing trouble. That is, a locally stored frame in the decoder might display automatically after two or three false entries and tell the user to press a simple sequence which in turn accesses an index frame. The principle underlying this strategy is to interrupt failure and help a user achieve a minimal level of success. Clearly, there are alternative strategies. However, it appears to be quite important for users to achieve some success in their first encounter with a teletext system.

3. CONTENT SELECTIONS

This section treats user selection of content, based upon the meters which were attached to decoders. Included are the most popular frames and subject categories as well as changes in usage over time and the effects of updating on frequency of use.

3.1 Gross Statistics

The figures presented in Table 5 represent cumulative data from all ten public sites over the entire trial period. They do not reflect the variations in use from site to site nor do they distinguish between the 1981 and 1982 services[6]. Table 5 reveals that on average 26 people used teletext per day at each site. This average user looked at 8 frames per session and spent

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6. The totals represent the gross accesses recorded by our meters over the trial period. It should be noted that not all use was metered. Sometimes a meter tape filled up before a new tape could be put in the recorder. At other times, the meter was inadvertently shut off by someone at the site. We estimate that gross usage was five times the volume presented here. However, since we know the number of days a meter was active, we can accurately present usage per day. In subsequent tables, we do not use gross accesses. In some of the data (approximately 18%) the time of day or the specific frame number was missing. The net figures which we use to tabulate popular frames are based solely on those accesses for which we have a complete and accurate record. Each table specifies the number of accesses from which the table was constructed.

   The average session length in Table 5 was obtained by clocking a sample of users, as discussed in Section 2.2 The average holding time was derived from the meter data and represents the time period between two frame accesses. This includes both the time required to display the frame (access time) as well as the time required to read it. Average frame viewing time represents the average holding time minus the access time, which was approximately ten seconds over the entire length of the trial. The average number of user sessions was obtained by dividing the average number of accesses per site per day (204) by the average number of frames accessed per viewing session (8).

TABLE 5.

Gross Teletext Usage

June 1981 - July 1982

Recorded Frame Accesses	102,881
Active Meter Days (total for all sites)	505
Average Number of Frame Accesses per Site, per Day	204
Average Length of a Viewing Session	4:21
Average Frame Holding Time	:32
Average Frame Viewing Time	:22
Average Number of Frames Accessed per User Session	8
Average Number of User Sessions per Site, per Day	26

about four and one half minutes at the teletext TV. He or she spent approximately 20 seconds looking at/reading each frame, plus ten seconds waiting for the frame to be grabbed and displayed, after pressing the appropriate keys on the keypad.

Usage varied a good deal among the sites. At the Smithsonian and Martin Luther King library approximately fifty people used teletext each day, whereas ten or fewer people used it each day at the National Press Club and Lewinsville Senior Citizens Center.

Appendix C presents figures on usage at each of the public sites, during both 1981 and 1982.

It is important to exercise caution in drawing inferences about why some sites were more heavily used than others. The total number of sites in the study was limited and, further, many elements were at work in each situation. Nonetheless, it is possible to suggest a few factors which appear to have influenced usage. First, the volume of users was clearly related to the volume of traffic at each site. In addition, teletext was used more heavily when it supported or complemented the activities which normally occur in the location where it was placed. For example, the teletext TV was part of an exhibit area on new technology at the Smithsonian. At Martin Luther King library it was in a lobby area along with other information resources which complemented the library's activities. And, at the Bureau of National Affairs it was in a narrow lobby area where workers could check the weather before going home or take a short break from work and look at a video puzzle. Each of these sites had strong usage. By contrast, teletext did not "fit in" with the activities in the research reading room at the National Press Club.

In addition, teletext appears generally to have been used more at sites where the population had timely information needs (e.g. a teenager at Walt Whitman High School checking the weather in order to make a decision about the day's activities) and local information needs (e.g. people who wanted to know about events in Washington).

There is also some evidence that teletext may not be used heavily at sites with a large population of older citizens. However, more investigation will be required before a firm conclusion can be drawn.

3.2 Selection of Indexes and Content Frames

Table 6 examines the relationship between accesses to index frames (Main Index and Sub-Indexes) and content frames. It shows that index frames accounted for 44% of all accesses. This is noteworthy for a few reasons. First, it suggests that

TABLE 6.

Selection of Indexes and Content Frames

CATEGORY	% of All Selections 1981	1982	TOTAL
Master Index	20	24	22
Sub-Index	21	22	22
Content Frames	59	54	56
	100%	100%	100%

Based upon 82,240 accesses: 43,439 in 1981, and 38,801 in 1982.

index frames are a valuable place to locate important messages, e.g. a thunder storm alert, or, in a commercial system, advertising. Second, the frequency of accesses to index frames suggests that a system operator can decrease the effective waiting time of a teletext service by repeating index frames twice in a cycle. Curiously, the frequency of accesses to index frames was almost

as high in the trial homes (40% of all accesses were to an index frame).

3.3 Popularity of Topic Groups

Figures 3 and 4 show the relative popularity of topic groups in each of the two services offered during the trial. A topic group, e.g. Entertainment or News, includes accesses to the Sub-Index for a given topic, main content frames, and chained frames. It represents an aggregate of all selections for a given topic.[7]

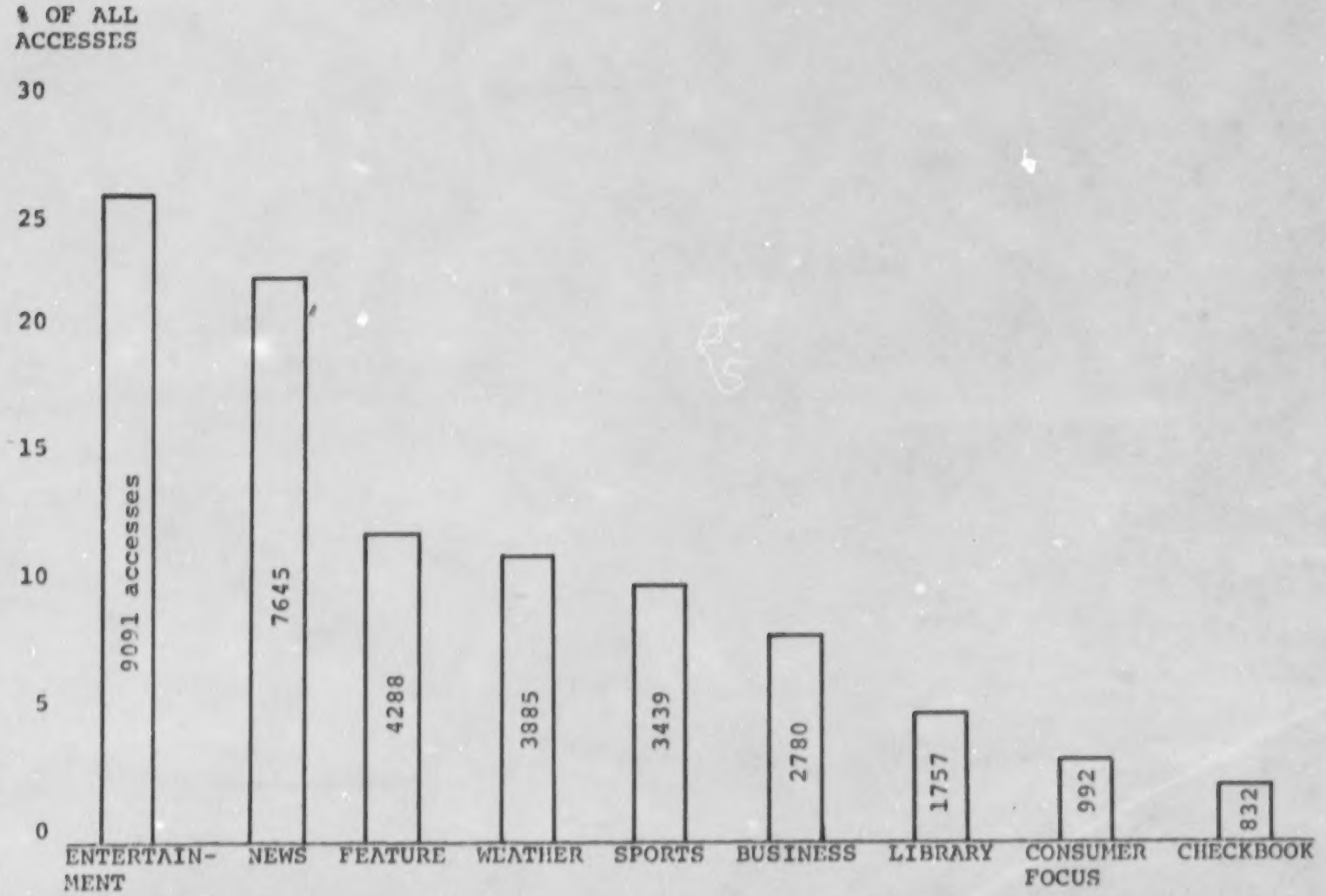
In the 1981 teletext service, Entertainment and News led all other topic groups. Features, Weather, Sports and Business showed moderate popularity, while Library and Consumer Information were relatively low. In the 1982 teletext service, Mind Play (games) and Weather led all other topic groups. However, the remaining groups - Bulletin Board, Analysis, Performance, For Kids, On View, and Electro Art - shared relatively similar degrees of popularity.

7. Figures 3 and 4 exclude accesses to the Main Index when presenting the share of accesses received by each topic group.

FIGURE 3.

Popularity of Topic Groups

1981 Teletext Service

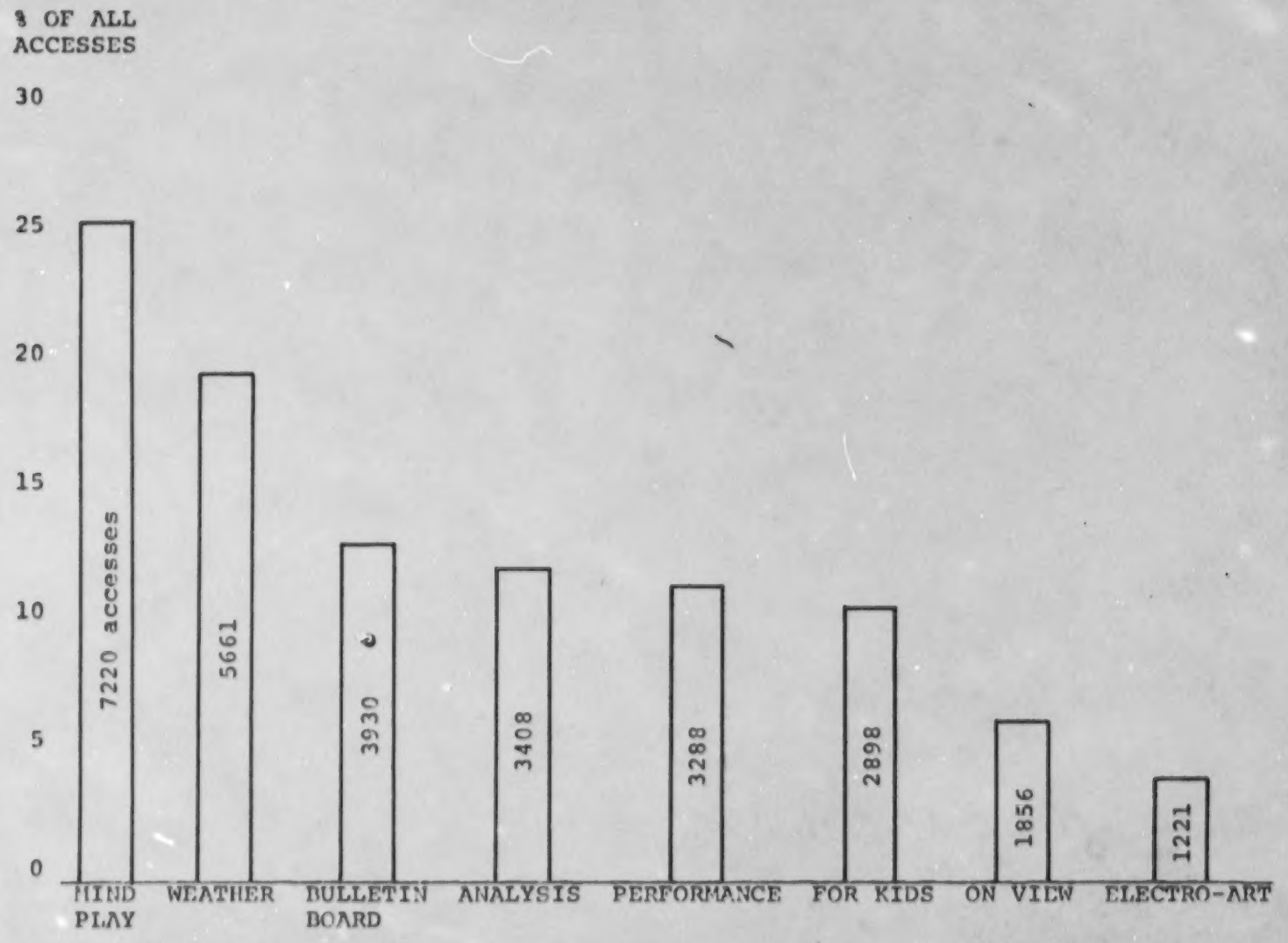


Based upon 34,709 accesses. Accesses to the Main Index are not included in this

FIGURE 4.

Popularity of Topic Groups

1982 Teletext Service



Based upon 29,482 accesses. Accesses to the Main Index are not included in this graph.

3.4 Selection Rating of Topic Groups

Since topic groups did not contain the same number of frames, the raw data in Figures 3 and 4 do not convey a complete picture. That is, it can be argued that certain topic groups received more accesses because they contained a greater number of frames which could be accessed.

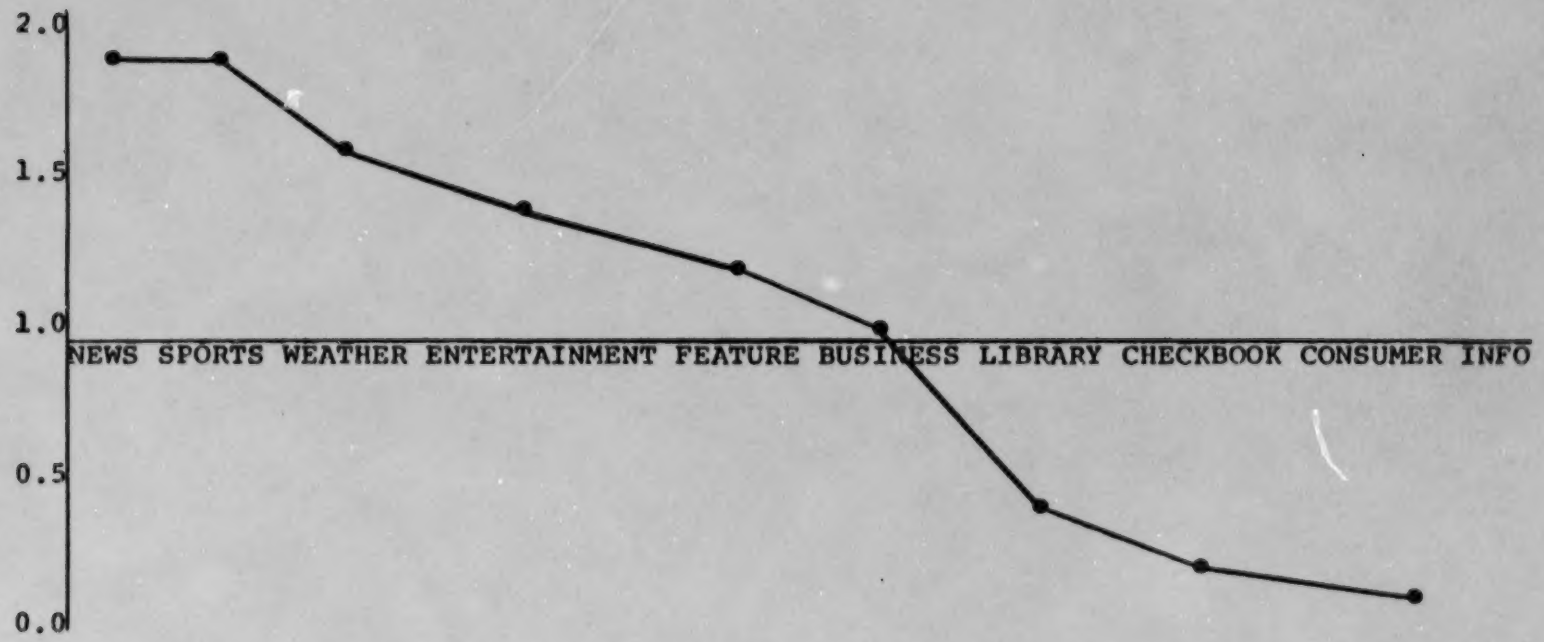
The Selection Rating of Topic Groups in Figures 5 and 6 are weighted measures of the popularity of each category. They show the relationship between the amount of content available in a given category and the amount actually selected. For example, if 10% of the content available contained sports information and 10% of all accesses were for sports information, the topic group would receive a rating of 1.0 This means that it received its "fair share" of accesses, given the number of frames allocated to the topic. If a topic group received less than its "fair share" of accesses, the rating would fall below 1.0 However, if it received more than its fair share, the rating would be higher than 1.0 In calculating this rating, all Sub-Indexes and chained frames are excluded, as well as accesses to the Main Index.

The Selection Rating for the 1981 teletext system shows that Sports was more popular than the raw figures suggest. Weather moves up in this rating as well and the popularity of Entertainment was slightly less than Figure 3 indicates.

The Selection Rating for the 1982 teletext system suggests that there were three very popular topics, Weather, Electro Art and Mind Play, while other topics shared relatively similar

degrees of popularity. Electro Art moves up dramatically in Figure 6 because it contained only one frame each day. In this sense it is odd to include it here as a topic group. However, it was listed among the other topic groups in the Main Index and is therefore appropriately included here.

FIGURE 5.
SELECTION RATING: 1981 TELETEXT SERVICE

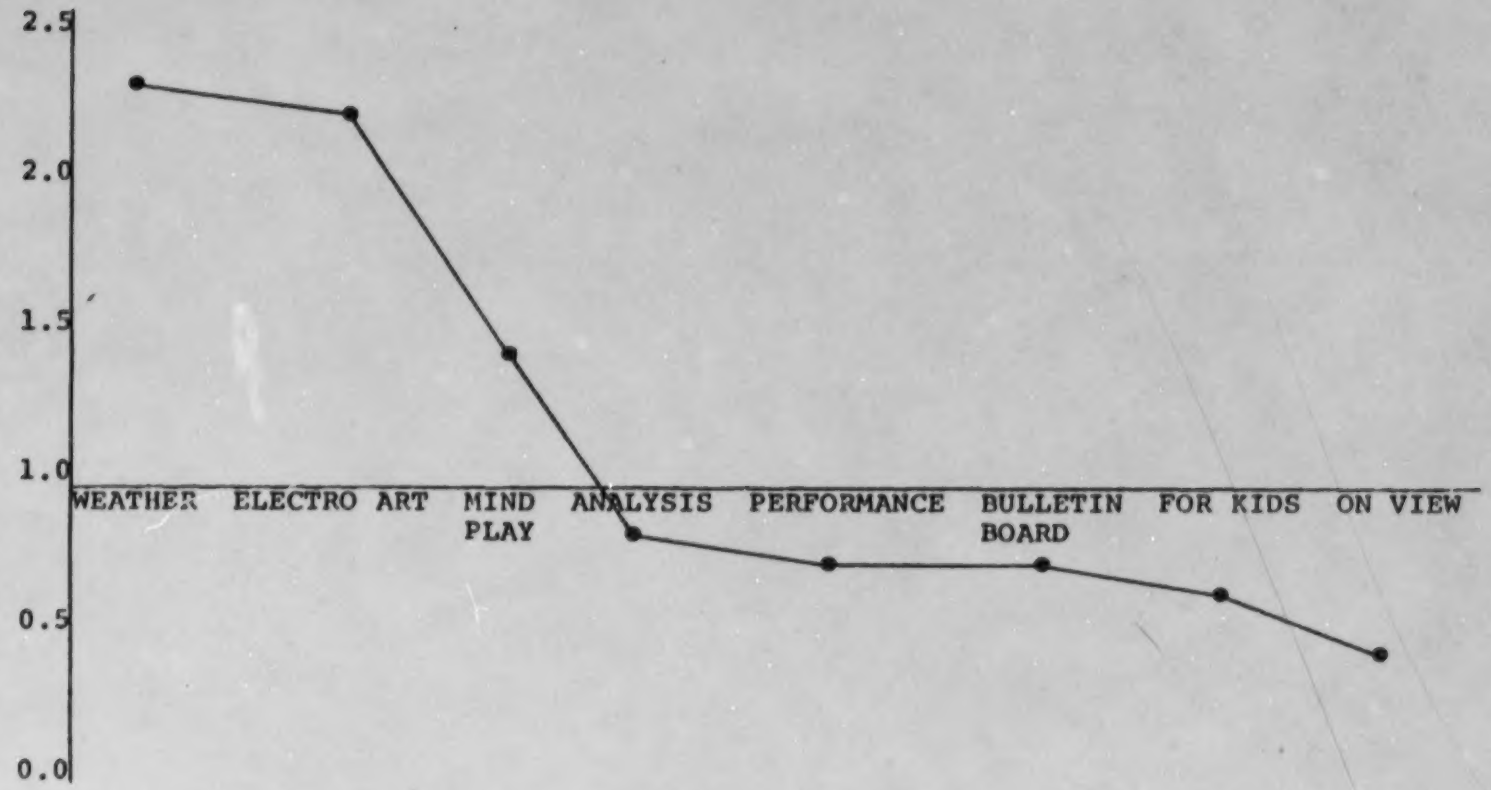


47

46

$$\text{Selection Rating} = \frac{\text{\% of frames selected}}{\text{\% of frames available}}$$

FIGURE 6.
SELECTION RATING: 1982 TELETEXT SERVICE



$$\text{Selection Rating} = \frac{\text{\% of frames selected}}{\text{\% of frames available}}$$

3.5 Most Popular Frames

Tables 7 and 8 rank the 30 most popular frames in the 1981 and 1982 teletext services. The rankings include accesses at all public sites, based upon more than 12,000 user sessions. We do not report the actual number of accesses to each frame since some frames were available on more days than others. To compensate for this, we calculated a score which includes an adjustment for the number of days when each frame was available. The score represents the relative popularity of a frame. Thus, a frame with a score of 8 was accessed twice as often as a frame with a score of 4, per available day.

Popular frames in the 1981 teletext service are concentrated among news stories, sports information, weather, and light entertainment such as horoscopes and Hollywood gossip. There is considerable competition among the top 20 frames. For example, the frame ranked number 20 received 40% as many accesses as the frame ranked number 1. Library information ranked well below the most popular frames, but it was highest among the community and consumer information services. Consumer tips and pricing received a relatively low rate of access, e.g. the most popular consumer information frame ranked 39.

Popular frames in the 1982 teletext service emphasized weather and games, with a second level of popularity among business, community events and entertainment listings. The competition among the top 20 frames was not as strong compared to the 1981 service. The frame ranked number 20 in the 1982 service

received only 25% as many accesses as the most popular frame in the same service. Community information and education were moderately popular, with 6 frames among the top 20.

TABLE 7.

30 Most Popular Frames

1981 Teletext Service

RANK	CONTENT	SCORE
1	Lead News Story	10.00
2	Horoscope	8.68
3	Sports Quiz	7.69
4	Movie Listings in Washington	7.07
5	Help (How to use teletext)	6.90
6	3-Day Weather Forecast	6.88
7	Feature*	6.62
8	Local Weather	6.00
9	Sports Story/Scores	5.90
10	News Story	5.78
11	Feature*	5.59
12	National Weather Map	5.41
13	Sports Story/Scores	5.33
14	News Story	5.15
15	News Story	5.12
16	Jumble Quiz	5.07
17	Weather in U.S. Cities	4.87
18	News Story	4.70
19	Entertainment Events in Washington	4.34
20	Long Range Weather Forecast	3.97

TABLE 7.

(cont.)

RANK	CONTENT	SCORE
21	Job Listings	3.65
22	Stock Report	3.55
23	IRS Tax Tip	2.82
24	Feature*	3.11
25	Business News	2.95
26	Feature*	2.82
27	WETA TV Listings	2.76
28	Library Events/Information	2.22
29	Library Events/Information	1.95
30	Library Events/Information	1.91

* Feature frames contained a variety of content. Topics included: book reviews; Hollywood gossip; science news; children's stories; movie reviews; and cultural events in Washington.

Note: The 1981 teletext service contained 100-120 frames each day. Ten of these frames were indexes, and 40-60 frames were "chained" to a main content frame. For example, the lead news story contained one main content frame and 6-8 additional chained frames which provided further information about the story. The listing of popular frames above does not consider index frames or any chained frames.

TABLE 8.

30 Most Popular Frames

1982 Teletext Service

RANK	CONTENT	SCORE
1	Ski Report	10.00
2	Local Weather	9.85
3	Electro Art	9.69
4	3-Day Weather Forecast	9.60
5	National Weather Map	9.00
6	Logic Puzzle	8.26
7	Games (e.g. word games & chess)	8.07
8	Job Listings	4.75
9	Alphabet (education)	4.41
10	Timely Community Issues	4.33
11	Congressional Insight	4.17
12	Washington Entertainment Listings	3.82
13	Community Events Listings	3.73
14	Bridge (problems and analysis)	3.65
15	Business Analysis	3.58
16	Events For Kids	3.27
17	Outdoor Events (e.g. Nature Walks)	2.81
18	Children's Story	2.63
19	Charts of Business Trends	2.62
20	Washington Entertainment Listings	2.56

TABLE 8.

(cont.)

RANK	CONTENT	SCORE
21	Washington Entertainment Listings	2.49
22	Consumer Information	2.45
23	IRS Tax Tip	2.44
24	Washington Entertainment Listings	2.33
25	Community Services Listings	2.19
26	Museum Events	2.18
27	Architectural Sights in Washington	1.68
28	Children's Story	1.65
29	Museum Events	1.61
30	Museum Events	1.22

Note: The 1982 teletext service contained 60-70 frames each day. Eight of these frames were indexes and 20-30 frames were "chained" to a main content frame. The listing of popular frames above does not consider index frames or any chained frames.

3.6 Changes in Use Over Time

In many trials of electronic text services, there has been a sharp drop in usage after an initial period of moderate to high usage. This occurred in the households of the Washington trial as well. However, such a "novelty effect" did not occur at the public sites. The absence of a novelty effect was evident both in locations with a relatively stable population (e.g. Martin Luther King Library and the Bureau of National Affairs) and those with a transient population (e.g. The Smithsonian).

Teletext usage did undergo many changes from month to month. However, the pattern is complex and we cannot fully explain it. We believe that seasonal traffic conditions (e.g. more visitors at the Smithsonian during certain months) are responsible for some of the variations, along with changes in weather. Undoubtedly, other unidentified elements affect usage as well.

In comparing the general popularity of the 1981 teletext service vs. the 1982 teletext service, some interesting patterns emerge. Overall, the 1982 service was slightly more popular than the 1981 service, as measured by the number of accesses per site, per meter day. However, this relates in large part to a change in sites. That is, two of the 1981 sites were dropped in 1982, and one new site was added. More interesting patterns emerge in comparing those sites which received the service during both 1981 and 1982. Usage increased at some sites while decreasing at others. The demographic profiles of these sites allow some inferences to be drawn. It appears that the 1982 service was

less popular at sites with a strong representation by middle-aged white males. However, it appears that the 1982 service was more popular at sites with a strong representation by teenagers, blacks (young and middle aged), and women (young and middle aged). The questionnaire, discussed in Section 4, provides additional support for drawing these inferences.

3.7 Updating and Frequency of Use

Each content category was updated twice daily, daily, weekly, or bi-weekly. In the residential sample there was a strong correlation between frequency of updating a frame and frequency of access by users. The same relationship was found in the public locations, but it was not as strong. This may relate to the constant stream of first time users who do not know how often specific frames are updated.

4. USER EVALUATIONS OF THE TELETEXT SERVICE

A group of 235 teletext users (60% were occasional or frequent users, and 40% had used the service only once) filled out a questionnaire about their reactions to teletext. The questionnaire was distributed during March-June 1982. Essentially, we asked four questions:

- How do you like teletext?
- Would you use it if it were permanently available in public locations?
- Would you pay an extra $ 200 over the normal cost of a TV set, in order to receive teletext at home?
- What kinds of information would you want from teletext when it becomes a regular service?

In addition, we gathered demographic data about each respondent, in order to match answers with the age, sex, race, occupation, household income, media use, and family composition of respondents.

4.1 General Reactions to the Service.

Table 9 presents the results of user reactions to the teletext service. Respondents were asked to circle the number which corresponded to their attitude: 1 if they agreed with the description on the left; 5 if they agreed with the description on the right; 2 or 4 if they leaned one way or the other; and 3 if they were undecided.

Users generally liked the service and rated the frames high on graphic attractiveness. They found it moderately useful, easy

TABLE 9.

QUESTION: HOW DO YOU LIKE TELETEXT?

ALL RESPONDENTS

(N=235)

1	2	3	4	5	
DON'T LIKE IT			● (4.2)		LIKE IT
DIFFICULT TO USE			● (4)		EASY TO USE
UGLY PAGES			● (4.1)		ATTRACTIVE PAGES
NOT USEFUL			● (3.9)		USEFUL INFORMATION
BORING			● (3.8)		FUN
TOO SLOW		● (2.3)			PAGES APPEAR QUICKLY

to use, and fun. However, the service was rated as too slow. This latter reaction is noteworthy since the average access time was 6-7 seconds during the period when respondents filled out the questionnaires.

In examining the answers in relation to demographic characteristics of respondents, a few interesting patterns emerge. The overall rating of the service was highest among the 18-30 age group; Hispanics; heavy TV viewers; students; frequent teletext users; and those households with 10-20K income. In addition, females rated it slightly higher than males, and Blacks rated it slightly higher than Whites.

The "usefulness" ratings are interesting as well. Blacks rated the service as more useful than Whites. Further, heavy TV viewers rated it very useful, as did blue collar workers and those households earning 10-20K. Ratings on the "fun" scale reveal similar patterns.

The graphics were rated as more attractive by females. Other demographic groups are clustered together.

4.2 Attractiveness of Public Site Terminals.

Table 10 provides an indicator of respondents' desires for a teletext service to continue at public sites. The general interest is very high (80% positive indication; 8% negative; and 12% unsure). It may be noted that females and those 31-60 seem to be slightly more reticent about public site teletext compared to males and those under 30. In addition, heavy consumers of newspapers and magazines were slightly more reticent about public terminals compared to light readers and non-readers.

TABLE 10.

Question: Would you use teletext in public locations such as this one, if it were offered on a permanent basis?

GROUP (N)	YES (%)	NO (%)	UNSURE (%)
All Respondents (234)	80	8	12
Males (179)	82	6	12
Females (55)	76	13	11
Under 12 (10)	90	10	0
12-17 (55)	93	2	5
18-30 (72)	83	4	13
31-45 (65)	66	12	22
46-60 (28)	75	18	7
Over 60 (7)	86	0	14
White (180)	78	8	14
Black (31)	90	3	7
Hispanic (7)	100	0	0
Other (17)	82	6	12

4.3 Willingness to Pay

Table 11 presents a measure of respondents' willingness to pay an extra $ 200 over the normal cost of a TV, in order to receive teletext at home. The overall positive response, 53.5%, may be interpreted as very encouraging to manufacturers of decoders and TV sets. It would be misleading however, to use the figures in Table 11 as a prediction of likely decoder sales.[8] Many other elements must be brought to bear in a calculation of the likely market penetration for teletext decoders in the decades ahead. Nonetheless, these results may be viewed as a positive indicator of a potentially strong market for teletext.

In examining the answers to this question in relation to the demographic characteristics of respondents, a series of fascinating patterns emerges.[9] These patterns may reveal more about the potential market for teletext than the gross percentage of all respondents who indicate a willingness to pay for a decoder equipped TV. It is curious, for example, that while males were far more likely than females to employ the teletext service, those females who did use it rated the service higher and indicated a stronger willingness to purchase a teletext TV. In addition, it is somewhat puzzling that individuals in the 31-45 age group indicate a weaker interest in purchasing a TV set with a teletext decoder. This response, along with a somewhat lower rating of the service by those 31-45, may reflect the competition for this groups' time and

8. For example, there is likely to be some bias in our results based upon the self selection of those who filled out a questionnaire.

9. Appendix D presents these data in more detail.

TABLE 11.

Question: Would you pay an extra $ 200 over the normal cost of a TV set to get teletext?

GROUP (N)	YES (%)	NO (%)	UNSURE (%)
All Respondents (230)	53.5	43.5	3
Males (173)	50	47	3
Females (57)	63	33	4
Under 12 (10)	90	10	0
12-17 (54)	56	44	0
18-30 (73)	60	37	3
31-45 (65)	32	62	6
46-60 (27)	59	37	4
Over 60 (7)	57	43	0
White (182)	50	47	3
Black (27)	67	30	3
Hispanic (7)	43	57	0
Other (16)	69	31	0
Normal Media Ownership (122)	47.5	47.5	4
Own 1 or more new media (104) *	60	39	1

* This category included all households which possessed one or more of the following: video game; video cassette recorder; personal computer; or videodisc player.

money. Older and younger teletext users indicated a greater willingness to pay. In the case of young respondents, a further question arises: to what degree will they influence family decisions to purchase new technology?

Media ownership is a strong indicator of willingness to purchase teletext. Those who have already purchased a VCR, video game, personal computer or videodisc player indicated a much greater likelihood of teletext purchase compared to those who have not purchased any "new technology."

TV viewing is another strong indicator. The more TV was watched in a household, the higher the percentage of respondents who indicated an interest in purchasing a teletext equipped TV.

The pattern of responses is quite interesting in relation to newspaper and magazine consumption. Light/moderate readers (i.e. 1 newspaper and 1 magazine) indicated a greater willingness to pay than heavy readers or non-readers. Our interpretation of this response is that heavy readers may feel less need for teletext information, while non-readers may have less desire for text based information generally. A light/moderate reader has an interest in information and a need for more - which teletext might help to fill.

The high indications of willingness to purchase by Blacks, blue collar workers and lower-middle income households (10-20K) may suggest a broader potential market for teletext than has been assumed to date. However, this study can provide only suggestive indicators of such a broad market.

4.4 Information Wants

Table 12 presents the results of an open-ended question in which teletext users were asked to write down the types of information and services they wanted from teletext when it becomes a regular service. Each respondent could indicate 1,2,3 or several information categories.

User requests for News and Sports are very strong, particularly since these frames were not available in the teletext service when the questionnaire was distributed. It is reasonable to expect that the other frequently requested categories were influenced, to some degree, by their presence in the service which respondents experienced. Nonetheless, Games, Weather, Entertainment and Lists of Events, and Business Information were ranked highly. At the same time, requests for Consumer Information, Science and Education, and Library Information were moderately frequent, particularly among lower income households.

It should be noted that many of the requests grouped under "Other" were for interactive services, e.g. banking, ticket ordering, and bill paying. Selected references on the "Other" category are presented in Appendix D.

The distribution of responses by demographic group contains many expected variations, e.g. males were more interested in Sports Information than females. However, there were some curious findings as well. For example, while respondents from households with a VCR, video game, or videodisc player all expressed a strong interest in Games, respondents from households with a personal computer did not

TABLE 12.

Question: When teletext becomes a regular service, what kinds of information would you want most?

Note: This was an open-ended question in which respondents could write whatever they wished.

ALL RESPONDENTS
(N= 230)

CATEGORY	N OF MENTIONS	% OF RESPONDENTS WHO INDICATE CATEGORY
News (general)	98	43
Entertainment & Lists of Events	85	37
Weather	77	33
Games	60	26
Sports	41	18
Business Information	41	18
Local News & Community Information	26	11
International News	25	11
Consumer Information & Prices	24	10
Science & Education	15	7
Library Information	14	6
Hobby Information	13	6
Job Listings	8	3
All Other Categories	50	22

Note: Inevitably, open-ended responses mix some categories which one would like to separate. The games category above includes both newspaper games such as a word jumble and video games. Most respondents simply wrote "games." However, other indicators suggest that some meant a newspaper style game while others meant a video arcade game. Similarly, the entertainment category includes lists of entertaining events (e.g. movie timetables) and entertaining information (e.g. horoscopes).

mention Games as frequently. Respondents from households with a personal computer expressed a stronger than average interest in Business Information and Local Community Information. In addition, it is curious that interest in Business Information declined as the number of persons in the respondent's household increased.

Further details about demographic group information "wants" are presented in Appendix D.

5. DISCUSSION AND CONCLUSIONS

A reader should exercise caution in drawing conclusions from our study. The findings in this report must be weighed along with results from the household research and other reliable investigations of teletext usage. With this caveat in mind, it may be argued that our study provides encouraging findings to public broadcasting stations and other potential service providers, as well as manufacturers of teletext equipment.

The general reaction to the teletext service was positive; usage was moderate to strong at most locations; and a majority of our survey respondents indicated a willingness to purchase a teletext equipped TV when they enter the market for a new TV. Along with these encouraging findings, we uncovered a number of problems associated with the system software and keypad design. However, most of these problems can be alleviated by alterations to the software and keypads. In addition, our findings suggest that teletext is not likely to receive universal acceptance in the near future. The population of users in the decade ahead is likely to be represented by a higher percentage of citizens under 45 years of age and, possibly, by a greater percentage of males. In other ways, our findings indicate that the population of teletext users may closely resemble the current population of heavy TV viewers.

In the discussion to follow, we attempt to highlight our major findings and present arguments, based upon the public site data, which address some of the fundamental issues raised in the Alternate Media

Center's proposal to the funding agencies.

5.1 Social Integration

Teletext must find a place within the everyday world of work and leisure routines, human traffic patterns, and information habits. Our investigation demonstrated this very clearly, as teletext was received well in some locations and poorly in others. Teletext was accepted and used when it fit comfortably into existing social patterns at a given location, and supported or complemented the raison d'etre of the building or space. Part of this acceptance was couched in the actions of local "opinion leaders" and "power brokers." That is, at sites where teletext usage was heavy we encountered strong support for the service by individuals with some authority who worked near the teletext TV, e.g. a guard at the Smithsonian, information booth personnel at Martin Luther King Library, and a maintenance worker at the Bureau of National Affairs. These individuals provided peer training/help for new users and generally fostered a positive attitude towards the service.

It appears, further, that the potential for a technology such as teletext to achieve social changes in an environment is related, directly or indirectly, to social acceptance and integration. We did not attempt a systematic assessment of social effects at the public sites. However, two forms of social change (one general and one specific) emerged during our investigation. At a few sites, the teletext TV became a meeting place, particularly during coffee breaks. In addition, at one site (Martin Luther King Library), the

service was at least partly responsible for the formation of a chess club. That is, a group of teenagers who regularly accessed the chess puzzle frame found a basis for group discussions and, in turn, formed a chess club. These social changes or effects occurred at the sites where teletext had strong local support and fit well into the existing social patterns.

5.2 Terminals in Public Locations

Teletext terminals in public locations appear to make a good deal of sense, for two reasons. First, our survey indicated that citizens like the public location terminals and will use them. Second, a public location terminal can allow many individuals (especially those who feel uncomfortable about new technology) to observe others using the service. This may help them to feel more comfortable about teletext terminals and/or try the service. It appears that the "general public" will require a great deal of assistance, over a long period of time, in order to gain reasonable skills with "terminals," whether they provide access to teletext, videotex or electronic banking. Simple teletext keypads in public locations may help the general public to move up on this learning curve.

In addition, our work at the public teletext sites has led us to recommend a series of practical measures for designing and installing public teletext TVs. These include: rugged, secure TV sets which users cannot touch; simple keypads with large keys and adequate space between keys; TV sets which operate in a teletext mode only; software which automatically displays the main index between

user sessions; few written instructions; and organization of frames in a simple linear manner.

5.3 Costs/Pricing in Public Locations

It is possible to develop an estimate of the costs associated with installing a teletext equipped TV set at a public location and, further, to project a range of costs per user session. These figures can, in turn, be used to discuss pricing options, e.g. a coin operated teletext terminal.

Working within current industry estimates for teletext equipped TVs, it is reasonable to project the following costs for a public teletext terminal:

$ 750	21 inch color TV with teletext decoder and large keypad.
250	installation of a small outdoor antenna and mounting of the TV in a wall bracket.
$ 1,000	Est. cost per unit, installed

If an institution or group amortized the unit over a five year period and, in addition, paid a yearly fee for maintenance of the unit, the cost per unit, per year would approximate the following:

$ 200	equipment cost, per year
250	maintenance contract plus electricity
$ 450	Est. cost per unit, per year

Our findings suggest that if a teletext TV is accepted by the public in a given location, an average of 25-50 people might use it each day. Calculating usage based upon a 250 day year would yield an

estimated 6,250 - 12,500 users per year. If an institution paid for the teletext TV from its own budget, this would yield a cost per user session ranging between 4¢ - 7¢.

If an institution or group decided to provide the teletext TV on a coin operated basis, some additional costs would be incurred for the coin operation equipment and personnel to collect revenues. Nonetheless, a price of 25¢ for a three minute session would adequately cover the institution's costs. This pricing model assumes that the institution does not have to pay for the teletext service. In this sense, it is analogous to coin operated television sets at airports. An alternative model in which one group provides the service and charges customers through coin operated terminals is beyond the scope of this report.[10]

5.4 System Issues

The teletext trial was intended, in part, to help public broadcasters decide a series of what may be described as system issues: e.g. how important are graphics; what is an acceptable waiting time for frames to appear after pressing the keypad; how many frames of information are necessary for a viable service; what types of information services do people want most; and, how can a system operator organize a transmission cycle in order to achieve maximum efficiency between number of frames and waiting time? Our study throws some light on

10. For additional components in such a model see, Martin Elton "Labor Costs of Creating Teletext Pages," New York: Alternate Media Center, Working Paper No. 5, 1982.

these issues.

5.4.1 Graphics. The response to graphics was very positive. They were clearly helpful in attracting people to the teletext TV and generated many spontaneous, favorable comments. Graphics were less appealing to middle age, male managers, who placed more emphasis on content alone. However, our data may be used to support an argument that high quality graphics provide strong appeal to (many) teenagers, Blacks, and women.

These indicators must be weighed against the cost of creating graphics and the toll they take in "slowing down" a teletext service. Moreover, our study does not provide any evidence about the usefulness of graphics or about their long term appeal in households.[11] However, our findings do suggest that graphics provide an initial attractiveness to many groups. Minimally, high quality graphics may help to encourage new teletext users in public locations and/or attract customers in the TV section of a department store.

5.4.2 Acceptable waiting time. The public site data provides a clear answer to the question, "What is an acceptable waiting time for frames to appear after a user presses the appropriate keys on a keypad?" There is no acceptable waiting time. People at the public sites wanted the frames to appear immediately.

Given the inherent limitations of a teletext system on the vertical blanking interval of a broadcast channel, it may be necessary to rephrase the research question: how long a waiting time will people tolerate before pounding the keypad or walking away in

11. See Champness & Alberdi, "Measuring Subjective Reactions to Teletext Page Design." New York: Alternate Media Center, Working Paper No. 2, 1981.

frustration? It appeared that the trial's service in Spring 1982, with an average waiting time of 6-7 seconds, was near the edge of user tolerance. The service received poor marks in our questionnaire for "slowness," but we did not observe many people walking away from the terminal due to the speed with which frames appeared.

5.4.3 Size of a teletext service. Our investigation provided no evidence that the public wants a large electronic text service or, conversely, that teletext will be hindered in its development because of its small size. Teletext users in the public locations expressed an interest in the "right" information, not "lots" of information. That is, they want information which appeals to their interests and needs. It appears that these interests and needs can be satisfied with a relatively small number of frames. Indeed, few individuals read all of the information which was available on topics, e.g. a lead news story, for which they had a strong interest.

It may be argued that while each user wants a relatively small number of frames, the diversity of public interests will require a large system in order to meet everyone's information wants. This is a reasonable argument and one which would support the value of videotex or cable delivered teletext services. Alternatively, broadcast teletext may be able to fulfill these needs by providing diverse services on multiple channels. The rationale for such an approach is discussed below.

5.4.4 Designing a teletext service. During the trial, there was much internal discussion about the relative appeal and usefulness of the 1981 teletext service vs. the 1982 teletext service. The public site data provide ample evidence for both sides to continue the debate. Central to the discussion has been the relative emphasis which should be placed upon frequent updating of hard information such as news headlines and sports scores vs. a stylized presentation of somewhat softer information such as games, entertainment and community events.

The public site research indicates that a teletext service will likely generate the largest audience by emphasizing frequently updated hard information, in particular news headlines, sports scores and weather. However, softer content such as word games, movie reviews and electronic art have strong appeal to segments of the public. A commercial network is likely to design a service with the greatest mass audience appeal. Other groups, e.g. public broadcasting, independent stations and cable operators can choose to compete for the same mass audience or design a service for segments of the audience (e.g. teenagers, Blacks or women).

5.4.5 Organization of a teletext cycle. The meter data from the public sites revealed that 44% of all accesses were requests for the Main Index or a Sub-Index. In addition, the 10 most popular content frames received more than 40% of all requests - other than index requests. This suggests a way to reduce effective access time without sharply reducing the number of frames in a teletext

service. By repeating index frames and the 10 most popular frames twice in a cycle, it is possible to reduce the average waiting time to 3 seconds - for two thirds of all accesses. The remaining one third of all accesses would have an average waiting time of 6 seconds. This is based upon a 12 second cycle of frames (the actual number of frames will vary in relation to the data rate, number of VBI lines, and average number of bytes per frame).

5.5 System Features and Teletext Standards

Most of the discussions about teletext standards, both within the FCC and at the Electronic Industry Association meetings have addressed data rates, data lines on the VBI and alternative teletext systems, e.g. Antiope, Ceefax, NABTS and Telidon. Less attention has been directed towards the system features which are to be made available to the public, e.g. reveal keys, chaining, and numbering of frames. Our public site data suggest that the specific features of a teletext system, e.g. how frames are numbered, may have a strong impact on public acceptance of the service. It appears that the design and manufacturing of decoders is proceeding with engineering issues at the forefront and user needs/wants/skills in a design limbo. Moreover, there may not be an opportunity to alter the basic system characteristics once the first generation of decoders is made available. That is, the system features in those early decoders may place a "lock" on changes which would render the first generation decoders obsolete.

5.6 Teletext and Public Broadcasting

This report has provided evidence which supports continued teletext activities by public broadcasting. It appears that teletext can meet a variety of public information needs and, further, that many people want the service.

At the same time, the public site results raise important policy questions for the public broadcasting community. Specifically, should a teletext service on public broadcasting stations appeal to the largest mass audience, or segments of the public who will otherwise be underserved by commercial teletext services? The issue is highlighted by usage statistics at the public sites in the Washington trial. The library frames in the 1981 teletext service received approximately 25% as many accesses as the news frames. From a commercial perspective, this would be inadequate and the library frames would likely be replaced. However, from a community service perspective the library frames would likely be retained. Moreover, the community information services - consumer prices, science and education, and library information - received stronger than average mention in our questionnaire from lower income households, a group which public broadcasting is mandated to serve. In this way, teletext raises the same policy questions with which the public broadcasting community has had to wrestle for many years.

APPENDIX A.

Content of the Service

TABLE 13.

The Teletext Service, January Through June, 1982

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
10-19	PERFORMANCE				
	Events Around Town	AMC	AMC/Washington	7	Once/day
	Theatre Movie Dance Goodie (reminders of events mentioned previously)				
	Discount Tickets	Ticket Place			
	Movie Review				Once/week
20-29	ON VIEW				
	Museums (Exhibitions) Sight (Architecture) Nature (Walk or scenic view)	AMC	AMC/Washington	7	Weekly
30-39	MIND PLAY				
	Game (Visual problem) Logic Puzzle	Mammoth Book of Games	AMC/Washington	11	Once/day
	Bridge	Tom Troop			
	Chess	Xerox Learning Systems			
	Alphabet (History of a letter)	American Heritage Dictionary			

TABLE 13

The Teletext Service, January Through June, 1982 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
40-49	FOR KIDS				
	Story or Activity	Children's Museum	AMC/Washington	11	Weekly
	Events	AMC			
	Story or Activity	Martin Luther King Library			
50-59	ANALYSIS				
	Labor, Business and Economic News	Bureau of National Affairs	BNA and AMC/ Washington	7	Once/day
	Economic Statistics (Charted)				
	Congressional Insight	Don Smith	AMC/Washington		
60-69	BULLETIN BOARD				
	Community Information	MLK Library	AMC/Washington	10	Weekly
	IRS Tax Tips	IRS			
	Consumer Information	General Services Ad.			
	Auto Safety	AAA			
	Job Listings	U.S. Dept. of Labor			Once/day

TABLE 13.

The Teletext Service, January Through June, 1982 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
70	ELECTRO-ART				
	Graphic Design	AMC	AMC/Washington	1	Weekly
80-89	WEATHER				
	Local	National Weather Service	AMC/Washington	4	Twice/day
	Regional				
	3-Day Forecast				
	National				
	Ski Conditions	AMC			
	INDEX PAGES			9	
	TOTAL PAGES			67	

TABLE 14.

The Teletext Service, June Through December, 1981

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
10-19	NEWS				
	A series of separate news stories	Washington Post	Washington Post	19	Once/day Twice on Monday
20-29	WEATHER				
	Local Regional National Select Cities 3 Day Forecast	National Weather Service	AMC/Washington	5	Once/day (Occasionally twice a day)
	Long Range Forecast				Once/month
30-39	BUSINESS/MONEY				
	Business News	Bureau of National Affairs	BNA and AMC/ Washington	9	Once/day
	IRS Tax Tip	Internal Revenue Service	AMC/Washington		Weekly
	Stock Market	Radio	AMC/Washington		Once/day
	Jobs	U.S. Dept. of Labor	AMC/Washington		Once/day

TABLE 14.

The Teletext Service, June Through December, 1981 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
40-49	SPORTS				
	Scores	New York Daily News	AMC/Washington	5	Once/day
	Stories	AMC			
	Odds	AMC			
50-59	LIBRARY				
	Materials for Children	Martin Luther King Library	AMC/New York	10	Once/week
	Community Events				
	Library Information				
60-69	ENTERTAINMENT				
	Events	Wash. Post	AMC/Washington	21	Once/day
	Horoscope	New York Daily News			
	Mini Movie Review	Daily News			
	Cheap Flicks	Wash. Post			
	Jazz Picks	Wash. Post			

TABLE 14.
The Teletext Service, June Through December, 1981 (con't)

Pages	Category and Content	Source	Page Composer	Approx. No. of Pages	Frequency of Updating
70-79	CHECKBOOK				
	Local Consumer Information	Consumer Checkbook	AMC/New York	10	Every other week
80-89	FEATURE				
	Wildcard	AMC	AMC/Washington	12	Once/day
	Science	Smithsonian			
	People	New York Daily News			
	Film Reviews	WETA			
	Congressional Insight	Congressional Quarterly			
	Events	WETA			
	Children	MLK Library & Children's Museum			
	Books	American Assoc. of Publishers			
90-99	CONSUMER FOCUS				
	Nine separate consumer tips	General Services Admin.	AMC/New York	9	Once/week
	INDEX PAGES			10	
	TOTAL PAGES			110	

89

90

APPENDIX B.

Teletext Users: Supplementary Tables

TABLE 15.

TELETEXT USERS AT THE BUREAU OF NATIONAL AFFAIRS

(N = 82)

GROUP	% OF ALL TELETEXT USERS	% OF ALL PERSONS PASSING NEAR TERMINAL
Sex		
Males	81.7	43.6
Females	18.3	56.4
Age		
Under 12	2.4	1.1
12-17	0.0	.4
18-30	52.4	33.6
31-45	40.2	54.0
46-60	5.0	10.5
60+	0.0	.4
Race		
White	71.9	65.1
Black	17.1	27.2
Other	11.0	7.6

TABLE 16.

TELETEXT USERS AT THE SMITHSONIAN

(N = 59)

GROUP	% OF ALL TELETEXT USERS	% OF ALL PERSONS PASSING NEAR TERMINAL
Sex		
Males	77.9	55.1
Females	22.1	44.9
Age		
Under 12	15.3	11.9
12-17	44.1	30.1
18-30	18.6	23.3
31-45	20.3	28.9
46-60	1.7	4.5
60+	0.0	1.1
Race		
White	94.9	94.3
Black	3.4	3.4
Other	1.7	2.3

TABLE 17.

TELETEXT USERS AT MLK LIBRARY

(N = 87)

GROUP	% OF ALL TELETEXT USERS	% OF ALL PERSONS PASSING NEAR TERMINAL
Sex		
Males	80.5	56.5
Females	19.5	43.5
Age		
Under 12	3.4	4.1
12-17	27.5	13.4
18-30	40.2	38.3
31-45	21.0	30.4
46-60	4.5	11.7
60+	3.4	2.2
Race		
White	33.3	36.2
Black	59.8	59.1
Other	6.9	4.7

TABLE 18.

LENGTH OF VIEWING SESSION AND TIME OF DAY

TIME OF DAY (N)	Length of Session: 3 Minutes OR LESS (%)	3:01-5:00 (%)	LONGER THAN 5 Minutes (%)	
9 - Noon (20)	55	25	20	= 100%
12:01 - 2:00 (58)	66	10	24	
2:01 - 4:00 (92)	55	18	27	
4:01 - 6:00 (60)	72	15	13	
6:00 - 8:00 (9)	22	22	56	

TABLE 19.

LENGTH OF VIEWING SESSIONS AND SEX/AGE OF USERS

USER GROUP (N)	Length of Session: 3 MINUTES OR LESS (%)	3:01-5:00 (%)	LONGER THAN 5 MINUTES (%)	
Sex				
Males (191)	60	16	24	= 100%
Females (48)	60	19	21	
Age				
Under 12 (17)	41	12	47	
12 - 17 (52)	56	17	27	
18 - 30 (90)	66	17	17	
31 - 45 (66)	65	15	20	
46 - 60 (11)	36	27	37	
60+ (*)				

* The sample of users over the age of 60 is too small to report here.

TABLE 20.

LENGTH OF VIEWING SESSION AND SITE

SITE* (N)	Length of Session: 3 MINUTES OR LESS (%)	3:01-5:00 (%)	LONGER THAN 5 MINUTES (%)	
MLK Library (87)	51	17	32	= 100%
Bureau of National Affairs (82)	70	17	13	
Smithsonian (59)	68	12	20	

* The observational study was concentrated at three sites. While there are some data on the length of viewing sessions at two additional sites, the sample size is too small to report here.

TABLE 21.

OBSERVED RECEPTION PROBLEMS

TOTAL OBSERVED USER SESSIONS	N WITH OBSERVED RECEPTION PROBLEM	% OF SESSIONS WITH OBSERVED RECEPTION PROBLEM
239	22	9.2

TOTAL OBSERVED FRAME ACCESSES	DEGREE OF OBSERVED RECEPTION PROBLEMS	% OF FRAME ACCESSES WITH RECEPTION PROBLEM
239 x 8 frames per session = 1912	During periods with observed reception problems, an average of 1 frame in 5 would not display completely in a single pass. 22 x 8 x .2 = 35.2	1.8

TABLE 22.

RECEPTION PROBLEMS AND USER DISCOMFORT

N OBSERVED SESSIONS WITH A RECEPTION PROBLEM	N SESSIONS IN WHICH USER EXHIBITED SOME DISCOMFORT OR TROUBLE IN USING TELETEXT	% OF RECEPTION PROBLEMS WITH ASSOCIATED USER DISCOMFORT
22	17	77

APPENDIX C.

Content Selections: Supplementary Tables

TABLE 23.

AVERAGE NUMBER OF USERS PER DAY

1981 Teletext Service

SITE	AVER. N USERS PER ACTIVE METER DAY
All Sites	24
Smithsonian	53
MLK Library	48
Rockville, MD Community Center	37
Bureau of National Affairs	31
Walt Whitman High School	29
Gallaudet College	14
Children's Museum	11
National Press Club	10
Senior Citizen Center	6

Average Length of a Viewing Session: 4:21

TABLE 24.

AVERAGE NUMBER OF USERS PER DAY

1982 Teletext Service

SITE	AVER. N USERS PER ACTIVE METER DAY
All Sites	28
MLK Library	47
Smithsonian	40
Walt Whitman High School	38
American Automobile Association	33
Bureau of National Affairs	24
Rockville, MD. Community Center	12
Gallaudet College	8
National Press Club	4

Average Length of a Viewing Session: 4:21

TABLE 25.

SUB INDEX SELECTIONS

1981 Teletext Service

SUB INDEX	N SELECTIONS	% OF ALL SELECTIONS
Entertainment	2,274	24.6
News	1,519	16.4
Sports	1,249	13.4
Weather	1,090	11.7
Feature	1,025	11.1
Business	835	9.0
Library	624	6.7
Consumer Focus	354	3.8
Checkbook	298	3.2
ALL PUBLIC SITES	9,268	100.0

TABLE 26.

SUB INDEX SELECTIONS

1981 Teletext Service

SITE	(% of all selections) ENTERTAINMENT	NEWS	SPORTS	WEATHER	FEATURE
All Sites	24.6	16.4	13.4	11.7	11.1
Smithsonian	25.0	15.4	14.4	14.4	10.4
MLK Library	22.3	17.6	14.1	9.3	11.7
Children's Museum	26.3	21.6	9.5	13.2	12.3
Rockville, MD. Jewish Community Center	30.6	12.1	15.5	10.3	8.3
Senior Citizen Center	21.8	16.9	9.8	12.4	15.0
Gallaudet College	21.7	17.4	8.5	13.6	8.1
National Press Club	12.0	21.6	8.9	10.7	14.0
Walt Whitman High School	30.8	9.8	23.8	11.4	9.5
Bureau of National Affairs	27.6	12.4	8.8	8.1	14.5

SUB INDEX SELECTIONS
(cont.)

1981 Teletext Service

SITE	(% of all selections) BUSINESS	LIBRARY	CONSUMER FOCUS	CHECKBOOK
All Sites	9.0	6.7	3.8	3.2
Smithsonian	9.4	5.1	3.5	2.3
MLK Library	9.5	8.4	3.1	3.9
Children's Museum	6.0	5.0	3.9	2.8
Rockville, MD. Jewish Community Center	8.3	7.9	4.0	2.9
Senior Citizen Center	6.0	9.4	4.9	3.8
Gallaudet College	11.1	9.8	6.4	3.4
National Press Club	10.2	8.5	8.5	5.6
Walt Whitman High School	6.6	4.4	2.9	.7
Bureau of National Affairs	14.8	3.5	3.2	7.1

TABLE 27.

SUB INDEX SELECTIONS

1982 Teletext Service

All Public Sites

SUB INDEX	N SELECTIONS	% OF ALL SELECTIONS
Mind Play	1,956	20.0
Weather	1,821	18.6
Electro Art*	1,221	12.4
Performance	1,160	11.8
Bulletin Board	1,137	11.6
Analysis	958	9.8
For Kids	897	9.1
On View	664	6.8
	9,814	100.0

* Electro Art is difficult to classify. It was listed in the Main Index, just as the other categories above were listed. However, a user who selected Electro Art received the art frame immediately. In this sense, it was not a sub-index. It is listed here since it was a category within the Main Index and one alternative among the others listed above.

TABLE 28.

SUB INDEX SELECTIONS

1982 Teletext Service

(% of all selections)

SITE	MIND PLAY	WEATHER	ELECTRO ART	PERFORMANCE
All Sites	20.0	18.6	12.4	11.8
Smithsonian	23.9	13.9	15.6	10.8
MLK Library	20.0	15.3	11.2	13.9
Rockville, MD Jewish Community Center	18.1	19.3	12.3	10.2
Gallaudet College	14.1	13.0	12.0	14.1
National Press Club	16.2	14.1	12.7	13.3
Walt Whitman High School	18.9	21.9	17.2	9.7
Bureau of National Affairs	17.3	22.4	8.8	11.6
American Automobile Assoc.	18.6	26.5	8.7	12.2

SUB INDEX SELECTIONS

1982 Teletext Service
(cont.)

SITE	BULLETIN BOARD	(% of all selections) ANALYSIS	FOR KIDS	ON VIEW
All Sites	11.6	9.8	9.1	6.8
Smithsonian	8.7	6.4	13.5	7.1
MLK Library	13.4	9.3	10.0	6.8
Rockville, MD Jewish Community Center	9.6	7.0	15.5	8.0
Gallaudet College	20.7	9.8	7.6	8.7
National Press Club	14.8	12.7	5.6	10.6
Walt Whitman High School	9.5	7.8	7.8	7.1
Bureau of National Affairs	12.2	16.3	5.3	5.9
American Automobile Assoc.	14.2	8.4	5.4	6.1

TABLE 29.

FRAMES SELECTED/FRAMES AVAILABLE

1981 Teletext Service

Note: This table excludes all index frames and chained frames. It shows the relationship between the amount of content available in a given category and the amount actually selected.

CATEGORY	% OF FRAMES SELECTED	% OF FRAMES AVAILABLE	SELECTION RATING
News	16.5	8.8	1.9
Sports	11.7	6.1	1.9
Weather	19.5	11.9	1.6
Entertainment	19.9	14.6	1.4
Feature	11.6	9.9	1.2
Business	7.6	7.9	1.0
Library	7.7	18.3	.4
Checkbook	2.1	8.1	.3
Consumer Focus	3.4	14.4	.2

Average Rating = 1.0

Based upon 13,998 frame selections

$$\text{Selection Rating} = \frac{\%\text{ of frames selected}}{\%\text{ of frames available}}$$

TABLE 30.

FRAMES SELECTED/FRAMES AVAILABLE

1981 Teletext Service

SITE	(Selection Rating) NEWS	SPORTS	WEATHER	ENTERTAINMENT	FEATURE
All Sites	1.9	1.9	1.6	1.4	1.2
Smithsonian	1.6	2.4	1.9	1.3	1.2
MLK Library	2.2	1.9	1.2	1.3	1.3
Children's Museum	2.5	1.0	1.7	1.6	1.1
Rockville Jewish Comm. Center	1.3	2.2	1.5	1.9	.9
Senior Citizen Center	1.8	1.8	2.4	1.0	1.1
Gallaudet College	2.1	1.3	2.3	1.3	.8
Nat. Press Club	2.6	1.5	1.7	.4	1.3
Walt Whitman High School	1.2	2.6	1.9	2.0	.9
Bureau of Nat. Affairs	1.1	1.4	1.1	1.6	1.5

$$\text{Selection Rating} = \frac{\% \text{ of frames selected}}{\% \text{ of frames available}}$$

FRAMES SELECTED/FRAMES AVAILABLE

1981 Teletext Service
(cont.)

SITE	(Selection Rating) BUSINESS	LIBRARY	CHECKBOOK	CONSUMER FOCUS
All Sites	1.0	.4	.3	.2
Smithsonian	.7	.4	.1	.2
MLK Library	1.1	.5	.3	.3
Children's Museum	.6	.4	.2	.2
Rockville Jewish Community Center	.7	.5	.4	.2
Senior Citizen Center	.7	.5	.1	.3
Gallaudet College	.6	.4	.2	.4
National Press Club	1.8	.4	.4	.3
Walt Whitman High School	.7	.3	.02	.2
Bureau of National Affairs	2.2	.2	.8	.2

TABLE 31.

FRAMES SELECTED/FRAMES AVAILABLE

1982 Teletext Service

Note: This table excludes all index frames and chained frames. It shows the relationship between the amount of content available in a given category and the amount actually selected.

CATEGORY	% OF FRAMES SELECTED	% OF FRAMES AVAILABLE	SELECTION RATING
Weather	25.2	11.2	2.3
Electro Art	8.5	3.8	2.2
Mind Play	21.5	15.2	1.4
Analysis	8.0	9.9	.8
Performance	11.7	16.6	.7
Bulletin Board	12.3	17.0	.7
For Kids	6.7	11.3	.6
On View	6.2	15.0	.4

Based upon 9,814 frame selections

Average Rating = 1.0

$$\text{Selection Rating} = \frac{\% \text{ of frames selected}}{\% \text{ of frames available}}$$

TABLE 32.

FRAMES SELECTED/FRAMES AVAILABLE

1982 Teletext Service

SITE	(Selection Rating) WEATHER	ELECTRO ART	MIND PLAY	ANALYSIS
All Sites	2.3	2.2	1.4	.8
Smithsonian	1.7	3.2	1.5	.5
MLK Library	1.5	2.1	1.6	.8
Rockville, MD Jewish Community Center	2.6	2.6	1.5	.2
Gallaudet College	2.2	1.6	.8	.8
National Press Club	1.8	1.3	1.4	1.7
Walt Whitman High School	3.3	2.9	1.4	.4
Bureau of National Affairs	2.7	1.4	1.2	1.5
American Automobile Assoc.	2.5	1.6	1.5	.6

$$\text{Selection Rating} = \frac{\% \text{ of frames selected}}{\% \text{ of frames available}}$$

FRAMES SELECTED/FRAMES AVAILABLE

1982 Teletext Service
(cont.)

(Selection Rating)

SITE	PERFORMANCE	BULLETIN BOARD	FOR KIDS	ON VIEW
All Sites	.7	.7	.6	.4
Smithsonian	.7	.6	.9	.5
MLK Library	.8	.9	.6	.5
Rockville, MD Jewish Community Center	.4	.6	1.1	.4
Gallaudet College	.7	1.4	.6	.4
National Press Club	.7	1.1	.2	.3
Walt Whitman High School	.5	.6	.5	.3
Bureau of National Affairs	.7	.6	.4	.3
American Automobile Assoc.	.8	.8	.5	.3

APPENDIX D.

User Evaluations: Supplementary Tables

(Returned Questionnaires = 235)

Note: A reader who would like a copy of the questionnaire should contact the authors.

Q: Would you pay an extra $ 200 over the normal cost of a TV set to get teletext?

GROUP (N)	YES (%)	NO (%)	UNSURE (%)
MLK Library (45)	76	24	0
National Press Club (8)	63	37	0
The Smithsonian (25)	76	20	4
Walt Whitman H.S. (26)	38	62	0
Bureau of National Affairs (48)	31	67	2
Jewish Community Center (11)	36	64	0
American Automobile Association (66)	52	41	7
First Time User (99)	62	35	3
Occassional User (53)	40	56	4
Frequent User (69)	48	49	3
Blue Collar (12)	58	33	8
Managerial/ Professional (106)	44	52	4
Secretary/ Clerical (16)	50	44	6
Student (84)	65	35	0
Retired (6)	67	16	16
Own VCR (50)	66	34	0
Own Video Game (68)	63	37	0
Own Videodisc Player (10)	90	10	0
Own Personal Computer (40)	65	35	0

TABLE 33.

Q: Would you pay an extra $ 200 over the normal cost of a TV set to get teletext?

GROUP (N)	YES (%)	NO (%)	UNSURE (%)
Total Number of People in Household			
1 (27)	52	48	0
2 (49)	57	37	6
3 (34)	50	47	3
4 (50)	48	50	2
5 or more (63)	60	37	3
Total Household Income			
Under $ 10,000 (7)	28	71	0
$ 10-20,000 (27)	81	19	0
$ 20-30,000 (39)	54	41	5
$ 30,000 or more (151)	51	45	4
Household TV Viewing			
Under 2 hrs. per day (57)	44	51	5
2-4 hrs. per day (85)	58	40	2
4-6 hrs. per day (49)	63	35	2
6 or more hrs. per day (43)	70	30	0
Respondent's Newspaper Consumption			
No newspapers (33)	52	48	0
1 newspaper (113)	61	35	4
2 or more newspapers (77)	51	47	2

TABLE 33.

Q: Would you pay an extra $ 200 over the normal cost of a TV set to get teletext?

GROUP (N)	YES	NO	UNSURE
Respondent's Magazine Consumption			
No magazines (29)	52	44	4
1 magazine (40)	65	33	2
2 or more magazines (155)	53	45	2

TABLE 34.

Would you use teletext in public locations?

GROUP (N)	YES (%)	NO (%)	UNSURE (%)
Own VCR (49)	78	12	10
Own Video Game (71)	83	7	10
Own Videodisc Player (10)	90	10	0
Own Personal Computer (40)	88	5	7
Household TV Viewing			
Under 2 Hours (57)	80	7	13
2-4 Hours (85)	82	6	12
4-6 Hours (50)	80	10	10
6 or more Hours (33)	79	6	15
Respondent's Newspaper Consumption			
0 Newspapers (33)	82	9	9
1 Newspaper (114)	85	5	10
2 or more Newspapers (70)	70	10	20
Respondent's Magazine Consumption			
0 Magazines (29)	86	10	4
1 Magazine (40)	83	5	12
2 Magazines or more (148)	78	7	15
Frequency of Teletext Use			
First Time (101)	80	10	10
Occasionally (55)	73	11	16
Frequently (74)	84	1	15

TABLE 34.
Would you use teletext in public locations?

GROUP (N)	YES (%)	NO (%)	UNSURE (%)
Blue Collar (14)	79	7	14
Manager/Professional (106)	73	10	17
Secretary/Clerk (15)	93	7	0
Student (84)	93	4	3
Retired (10)	90	0	10
Household Size			
1 Person (27)	78	11	11
2 Persons (48)	79	4	17
3 Persons (35)	86	9	5
4 Persons (50)	80	4	16
5 or more Persons (64)	81	11	8
Household Income			
Under 10K (8)	88	12	0
10-20K (28)	96	4	0
20-30K (41)	73	10	17
30K or more (150)	78	8	14
Site			
MLK Library (49)	90	6	4
Press Club (8)	80	20	0
Smithsonian (25)	80	8	12
Whitman High School (26)	88	4	8
Bureau of Nat. Affairs (48)	59	17	24
Community Center (11)	100	0	0
Amer. Automobile Assoc. (66)	79	5	16

% of Respondents Who Indicate Category

Q: When teletext becomes a regular service, what kinds of information would you want most?

CATEGORY	SEX		AGE OF RESPONDENT					
	MALE	FEMALE	-12	12-17	18-30	31-45	46-60	60+
(N)	(173)	(57)	(10)	(52)	(68)	(65)	(28)	(7)
News (general)	43	40	40	40	42	42	46	14
Entertainment & Lists of Events	34	46	20	25	29	52	54	0
Weather	29	46	20	20	36	31	57	29
Games	27	25	60	44	21	9	21	43
Sports	21	9	30	24	25	8	11	0
Business Information	20	12	0	4	10	29	39	0
Local News & Community Information	8	21	0	4	15	12	18	0
International News	12	7	0	15	21	3	0	0
Consumer Information & Prices	12	7	0	0	11	22	7	0
Science & Education	4	14	0	5	10	6	4	0
Library Information	7	4	0	7	3	9	4	0
Hobby Information	4	11	0	0	3	0	36	0
Job Listings	4	2	0	4	9	0	0	0
All Other Categories	18	32	20	24	15	29	18	0

TABLE 35.

% of Respondents Who Indicate Category

		RACE				HOUSEHOLD INCOME			
CATEGORY	WHITE	BLACK	HISPANIC	OTHER	-10K	10-20K	20-30K	30+
(N)	(180)	(31)	(7)	(15)	(8)	(28)	(41)	(150)
News (general)	47	13	43	24	25	32	49	45
Entertainment & Lists of Events	38	23	71	24	38	21	34	41
Weather	39	10	14	18	25	32	32	34
Games	19	39	14	54	0	43	20	17
Sports	17	10	14	24	13	14	17	21
Business Information	20	6	0	6	0	0	5	27
Local News & Community Information	12	10	14	6	13	11	12	12
International News	10	13	14	12	13	18	17	8
Consumer Information & Prices	10	10	0	18	13	21	7	11
Science & Education	5	6	14	12	13	14	5	5
Library Information	7	3	0	6	13	4	5	4
Hobby Information	7	3	0	0	0	4	5	6
Job Listings	2	6	0	6	0	7	7	2
All Other Categories	23	26	14	12	50	25	12	19

TABLE 35.

% of Respondents Who Indicate Category

CATEGORY	MLK LIBRARY	PRESS CLUB	SMITH-SONIAN	HIGH SCHOOL	BUREAU NAT. A.	COMMUN. CENTER	AMERICAN AUTOM. A.
	SITE						
(N)	(49)	(8)	(25)	(26)	(48)	(11)	(66)
News (general)	31	63	56	50	44	45	38
Entertainment & Lists of Events	27	13	48	27	38	45	48
Weather	18	63	48	23	27	0	52
Games	45	13	20	19	15	55	20
Sports	6	13	36	27	8	45	18
Business Information	14	13	12	4	19	0	35
Local News & Community Information	8	13	12	12	15	9	14
International News	8	0	28	19	13	0	5
Consumer Information & Prices	2	0	4	0	15	9	23
Science & Education	6	0	24	0	4	0	6
Library Information	10	0	8	4	0	27	5
Hobby Information	0	0	12	0	0	0	14
Job Listings	8	0	0	0	0	0	5
All Other Categories	18	0	28	35	13	0	32

TABLE 35.

% of Respondents Who Indicate Category

HOUSEHOLD MEDIA OWNERSHIP

CATEGORY	NORMAL MEDIA	SOME ADVANCE MEDIA	OWN VCR	OWN VIDEO GAME	OWN VIDEODISC PLAYER	OWN PERSONAL COMPUTER
(N)	(129)	(106)	(49)	(71)	(10)	(40)
News (general)	40	43	39	45	30	40
Entertainment & Lists of Events	38	38	41	23	20	40
Weather	33	32	33	30	10	35
Games	16	32	39	35	100	12
Sports	19	17	14	20	0	15
Business Information	22	17	14	11	10	25
Local News & Community Information	9	15	22	13	30	28
International News	11	10	6	13	10	10
Consumer Information & Prices	16	8	10	8	0	8
Science & Education	6	7	6	4	0	0
Library Information	5	6	4	7	0	3
Hobby Information	8	2	0	0	0	0
Job Listings	2	2	0	4	0	3
All Other Categories	22	21	20	17	10	30

Note: Normal Media Ownership was defined as any combination of TVs, radios, stereos, etc. exclusive of a VCR, Video Game, Videodisc Player or Personal Computer. Advanced Media Ownership included homes with one or more of the new media.

% of Respondents Who Indicate Category

CATEGORY	FREQUENCY OF TELETEXT USE			PERSONS IN HOUSEHOLD				
	FIRST TIME	OCCAS-IONALLY	FREQ-UENTLY	1	2	3	4	5+
(N)	(101)	(55)	(74)	(27)	(48)	(35)	(50)	(64)
News (general)	40	42	47	63	43	40	44	38
Entertainment & Lists of Events	36	36	41	59	52	9	44	34
Weather	34	35	30	30	48	31	30	28
Games	16	20	38	19	19	23	28	31
Sports	13	16	26	0	19	31	14	27
Business Information	24	16	18	37	21	20	16	13
Local News & Community Information	12	13	11	7	4	17	12	14
International News	14	2	15	7	8	17	4	14
Consumer Information & Prices	13	5	12	15	15	6	12	6
Science & Education	9	5	4	4	6	14	2	5
Library Information	9	0	7	0	4	6	6	3
Hobby Information	11	0	1	4	17	6	2	0
Job Listings	2	4	4	4	4	0	6	3
All Other Categories	18	25	22	22	17	34	14	20

% of Respondents Who Indicate Category

CATEGORY	HOUSEHOLD TV VIEWING (Hours Per Day)				RESPONDENT'S READING HABITS (Newspapers)			(Magazines)		
	-2	2-4	4-6	6+	0	1	2+	0	1	2+
(N)	(57)	(85)	(50)	(33)	(33)	(114)	(70)	(29)	(40)	(148)
News (general)	46	46	34	30	33	39	37	34	38	44
Entertainment & Lists of Events	40	45	28	6	18	38	46	41	20	37
Weather	32	33	36	27	12	37	37	17	43	34
Games	23	20	12	64	42	29	14	59	20	22
Sports	16	20	12	27	15	13	13	21	23	17
Business Information	14	21	12	18	6	15	31	14	0	25
Local News & Community Information	18	13	12	9	6	12	14	0	8	15
International News	9	12	10	3	6	8	14	0	5	13
Consumer Information & Prices	9	12	8	9	12	5	17	14	10	9
Science & Education	7	7	6	0	6	6	6	3	8	6
Library Information	7	5	4	0	3	2	9	0	3	7
Hobby Information	0	0	4	30	3	11	0	0	5	7
Job Listings	5	0	6	6	6	5	0	3	5	3
All Other Categories	16	21	22	9	15	22	20	10	5	17

TABLE 35.

% of Respondents Who Indicate Category

CATEGORY	RESPONDENT'S OCCUPATION				
	BLUE COLLAR	MANAGER/ PROFESSIONAL	SECRETARY/ CLERICAL	STUDENT	RETIRED
(N)	(14)	(106)	(15)	(84)	(10)
News (general)	57	44	13	49	10
Entertainment & Lists of Events	21	46	27	31	10
Weather	57	41	27	23	20
Games	0	22	27	36	0
Sports	43	14	0	25	10
Business Information	21	27	7	5	30
Local News & Community Information	29	14	20	5	0
International News	0	8	13	18	0
Consumer Information & Prices	14	14	7	4	0
Science & Education	14	5	13	6	0
Library Information	0	5	7	5	0
Hobby Information	7	9	7	1	0
Job Listings	21	2	7	2	0
All Other Categories	14	25	27	19	20

TABLE 36.

What kinds of teletext information do you want most?

Selected References in "Other" Category

Poetry

Closed Captioning

Graphics

Banking

Bill Paying

Ticket Ordering

Recipes

Tax Help

Telephone Listings

Erotic information

Advertising

Airline Arrivals and Departures

Fashion Information

Interviews

Black American News

Infant and Baby Care

Q: How do you like teletext? TABLE 37.

GROUP (N)	Don't Like/ Like it	Difficult/ Easy to Use	Ugly/ Attract.	Not Useful/ Useful	Boring/ Fun	Slow/ Quick
Males (176)	4.2	4.0	4.0	3.8	3.7	2.2
Females (59)	4.3	3.8	4.3	4.0	4.2	2.6
Under 12 (8)	4.3	4.2	4.3	3.9	4.2	2.6
12-17 (53)	4.3	4.3	4.0	3.9	3.9	2.1
18-30 (72)	4.5	4.1	4.3	4.1	4.2	2.5
31-45 (64)	3.9	3.7	3.9	3.4	3.4	2.1
46-60 (28)	3.8	3.4	4.1	3.9	3.6	2.4
Over 60 (7)	3.7	4.3	3.4	4.0	3.5	2.7
White (182)	4.1	3.9	4.1	3.8	3.8	2.2
Black (30)	4.3	4.5	4.1	4.4	4.2	3.2
Hispanic (7)	4.9	4.7	4.1	3.7	3.8	2.0
Other (17)	4.4	4.1	3.4	3.9	3.9	2.1
Normal Media Ownership (125)	4.3	3.9	4.1	3.7	3.9	2.4
Own 1 or more new media (112)	4.0	4.0	4.0	3.7	3.8	2.2

TABLE 37.

GROUP (N)	Don't Like/ Like it	Difficult/ Easy to Use	Ugly/ Attract.	Not Useful/ Useful	Boring/ Fun	Slow/ Quick
Own VCR (49)	4.2	3.9	4.0	4.0	3.9	2.4
Own Video Game (73)	4.2	4.2	4.1	4.2	4.0	2.3
Own Videodisc Player (10)	3.9	4.3	3.9	4.9	4.2	3.3
Own Personal Computer (42)	4.0	4.2	3.8	3.9	3.7	2.6
Household TV Viewing						
Under 2 hours (61)	3.8	3.8	4.0	3.4	3.4	2.1
2-4 Hours (83)	3.7	4.2	4.1	3.7	4.0	2.2
4-6 Hours (54)	4.2	3.8	4.2	4.0	4.0	2.4
Over 6 Hours (33)	4.5	4.4	4.1	4.6	4.2	2.7
Respondent Reads						
0 Newspapers (33)	4.3	4.4	4.2	4.0	4.0	2.3
1 Newspaper (127)	4.2	4.1	4.1	3.8	3.9	2.3
2 or more Newspapers (77)	4.1	3.8	4.0	3.7	3.7	2.3
0 Magazines (30)	4.3	4.5	4.1	4.1	4.1	2.5
1 Magazine (40)	4.1	4.1	3.9	3.7	3.7	2.4
2 or more Magazines (168)	4.2	3.9	4.0	3.8	3.8	2.3

TABLE 37.

GROUP (N)	Don't Like/ Like it	Difficult/ Easy to Use	Ugly/ Attract.	Not Useful/ Useful	Boring/ Fun	Slow/ Quick
Blue Collar (13)	4.4	4.4	3.7	4.3	4.1	3.0
Managerial/ Professional (110)	3.9	3.6	4.2	3.6	3.6	2.2
Secretary/ Clerical (17)	4.4	4.1	4.4	4.1	4.1	2.3
Student (88)	4.5	4.5	4.0	4.1	4.0	2.3
Retired (5)	4.0	3.6	4.2	3.4	3.6	2.6
Household Size						
1 Person (29)	3.9	4.0	3.8	3.4	3.3	2.2
2 Persons (51)	4.3	4.3	4.3	3.9	4.1	2.2
3 Persons (36)	4.3	3.8	4.2	4.0	4.0	2.2
4 Persons (54)	4.2	4.3	4.3	3.9	3.8	2.4
5 Persons or more (66)	4.1	4.1	3.8	4.0	3.8	2.4
Household Income						
Under 10K (7)	4.0	3.9	3.7	3.1	3.4	2.1
10-20K (28)	4.5	4.4	4.0	4.3	4.5	2.8
20-30K (46)	4.0	4.0	4.0	3.6	3.8	2.4
30K or more (152)	4.2	3.9	4.1	3.9	3.8	2.2

TABLE 37.

GROUP (N)	Don't Like/ Like it	Difficult/ Easy to Use	Ugly/ Attract.	Not Useful/ Useful	Boring/ Fun	Slow/ Quick
Frequency of Use						
First Time (98)	4.2	3.8	4.1	3.9	3.9	2.7
Occasionally (58)	3.9	4.1	4.0	3.5	3.6	2.0
Frequently (75)	4.4	4.3	4.1	4.0	4.1	2.3
Site						
MLK Library (52)	4.3	4.1	3.8	4.2	4.0	2.7
Press Club (6)	4.2	4.0	4.3	3.7	3.8	2.0
Smithsonian (29)	4 6	4.1	4.3	4.3	4.3	2.4
High School (28)	4.0	4.4	4.0	3.4	3.4	1.7
Bureau of Nat. Affairs (48)	3.8	3.4	4.0	3.3	3.6	1.9
Community Center (12)	4.6	4.8	4.5	3.5	3.8	2.2
American Automobile Association (68)	4.2	3.9	4.3	3.9	3.8	2.5